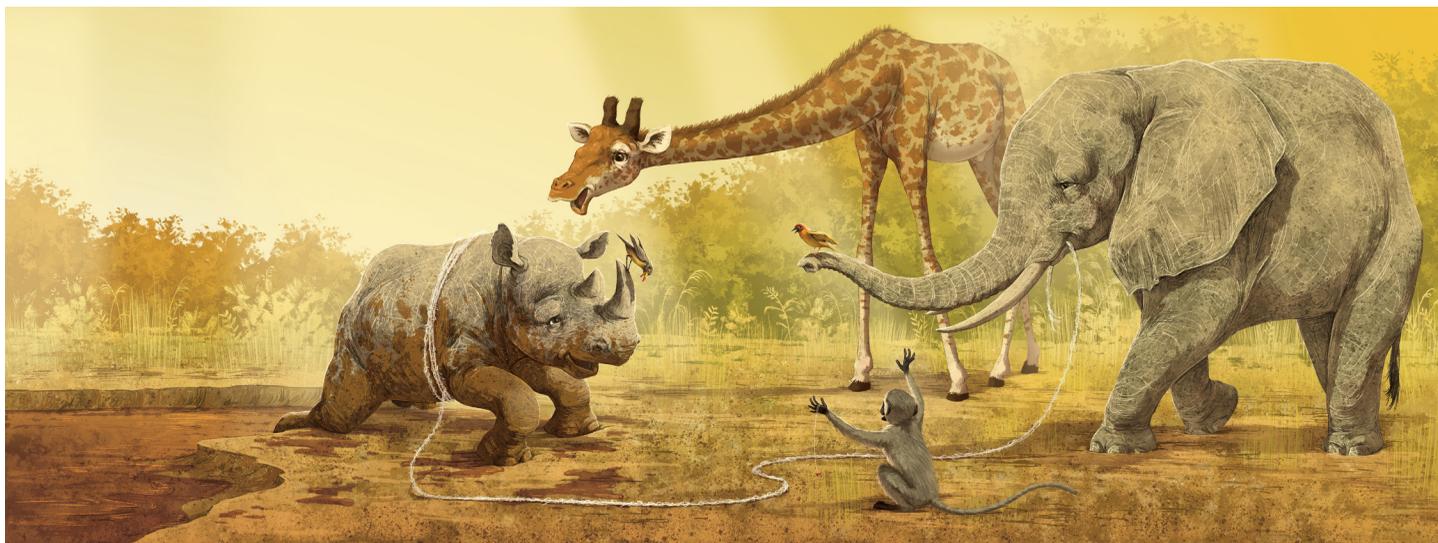


HELPING OUT

Activities to Accompany
Helping Brother Rhinoceros
& *African Rhinos: Conservation Crash* poster

By Lise Levy

Target Ages: Grades 3 – 6 (Middle School Transition)
with some material adapted for Pre-K – Grade 2



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 **WILD NATURE INSTITUTE**

Overview:

This collection of five activities is designed to complement the picture book *Helping Brother Rhinoceros* by using the story to develop a picture illustrating the interdependence of various environmental concepts and then showing how wildlife conservation issues affecting the rhinoceros and other wildlife interfere with that interdependence. The activities can be completed independently from each other or in sets depending on participant level and topic coverage desired. Some activities do require prior knowledge developed in previous activities. Although some of the activities are aimed at all ability levels and use a multidisciplinary approach, there are limitations for younger participants due to the concepts being developed and skill development required. However, the comprehensive focus of this collection, the effect of wildlife conservation issues on the interdependency in ecosystems, is still conveyed in those activities adapted for that level of participation. The "Introductory Reading Comprehension Activity," with its three general summary questions, should be used as a lead-in to all activities, or an activity sequence to tie in the storyline to the concepts addressed.

Further information on instructional strategies and correlation to current standards can be found in the ADDITIONAL INSTRUCTIONAL RESOURCES section located on the final pages.

Overall Objectives: Upon participating in the following activity related to the reading of *Helping Brother Rhinoceros*, the participant will be able to:

Develop a labeled picture or diagram to illustrate how the animal helpers in the story solved their problem by working together using the specific skills each of them had.

Distinguish unique characteristics or behaviors of organisms that help them survive in their environment and *identify them as adaptations.

Associate the variety of organisms (*biodiversity) in nature with the variety of unique physical characteristics or behaviors that provide them with different survival strategies.

Analyze a labeled picture or diagram that illustrates how the animal helpers in the story solved their problem and use it to re-create the process by participating in a physical reenactment (model) to help evaluate the role of each helper.

Determine that the specific physical characteristics or behaviors that organisms have that help them survive in their environment, or their *adaptations, allow them to perform a specific role or job in their environment, known as a *niche.

Recognize that organisms have specific roles or *niches in their environment that are interrelated and are therefore dependent on each other.

*Identify what is included in an organism's niche and distinguish some of these using information about various organisms.

*Construct various food chains and a food web to show how energy flow proceeds through an ecosystem and connects many different organisms.

*Provide examples of various types of organism interactions and relationships.

*Infer the need to conserve a variety of organisms, or biodiversity, in an ecosystem in order to maintain the interrelated dependence of organisms.

*Assess the at-risk status of the rhinoceros by using and evaluating map data of the rhinoceroses' current and historical range.

*Define a species as a group of organisms of the same type that share common characteristics and are alike in some manner.

*Differentiate between species that are threatened, endangered, or extinct.

*Identify biological and human-influenced factors that make species at risk of becoming endangered.

*Determine how likely a particular African savanna species is to become endangered by evaluating each species as to its possibility of being affected by the identified risk factors.

*Propose actions to address the identified risk factors that may help species be less affected.

Distinguish between wild and domestic animals in needs and treatment.

Identify respectful treatment of wild animals and defend the need for it.

*Recognize that the conservation problems experienced by rhinoceroses are caused by wildlife trade practices that are supported by human actions and are shared by many other wildlife species.

*Give examples of the difficulties that wild animals are experiencing and associate them with specific wildlife conservation issues.

*Analyze various methods being used to help conserve wildlife populations and determine how they are addressing the wildlife conservation issues.

*Assess how human actions can assist with wildlife conservation methods and choose to promote responsible conservation practices.

*Recommended for Upper Elementary (Grades 3 – 6) participants only.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for the **Next Generation Science Standards** that can be met using this activity to support instruction.

Complete Materials List:

Helping Brother Rhinoceros

Chalk/white board, covered bulletin board or chart paper

White paper

Crayons, colored markers, colored pencils, paint

African Savanna Wildlife Guide Cards

African Savanna Ecosystem Puzzle – Appendix A – 2 pages

Scissors

Tape

Glue (preferably glue sticks)

Skeins of thick yarn (optional)

Long pole or broom with a giraffe face attached to the end (optional)

African Rhinos: Conservation Crash poster

Post-It notes or various wild and domestic animal pictures and tape

Computer with Internet connection and digital projector

Drawing paper, poster paper, long roll of white paper for mural



INTRODUCTORY READING COMPREHENSION ACTIVITY

Levels: PreK – Grade 6 (Middle School Transition)

Subject Area: Reading

Duration: 1 hour

Setting: Classroom

Skills: Reading Comprehension

Summary:

This activity is designed to begin a discussion of *Helping Brother Rhinoceros* as an introduction to the various topics addressed in Activities 1 – 5. Each of the activities that follow will continue from this common beginning.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for ELA/Literacy standards that may be supported by this activity when used with the associated activities.

Materials:

Helping Brother Rhinoceros

Chalk or white board

Procedure:

Pre-Reading Preparation:

Prior to reading the story the presenter should ask the participants to predict what the story is about based on its title and cover illustration. From these predictions the participants should be engaged in developing questions that they expect to be answered by reading the story. The following questions should be included in those that are given:

- a. Why does Brother Rhinoceros need help?
- b. Who helps Brother Rhinoceros?
- c. How is Brother Rhinoceros helped?

1. Reading of ***Helping Brother Rhinoceros***

Non-Readers: Book read to them while they look at the illustrations, with answers to questions given orally and/or recorded by drawing pictures.

Early Readers: Book read to them while they follow along and look at the illustrations, with answers to questions given orally and written by presenter.

Readers: Book read by them, either silently, or out loud to the group, by taking turns. Remind them to look at the illustrations as they are reading. The answers can be given in writing by the participants, either individually or in a group, or as a class by recording on a chalk/white board.

2. Following the reading, a summary of the story can be discussed using the questions developed before reading. Have the participants refer to the illustrations to help remind them of the story.

3. When all of the pre-reading questions have been answered, give the participants the opportunity to add any other questions that they feel need to be answered. This summary and answers to the reading questions will be built on in each activity to develop related specific concepts.



ACTIVITY 1: HELPING HANDS, MANY TALENTS

Levels: PreK – Grade 6 (Middle School Transition)

Subject Area: Environmental Science

Duration: 1.5 – 2 hours (depending on the extent of coverage/level desired)

Setting: Classroom

Skills: Reading Comprehension, Analysis, Research

Summary:

This activity uses the story to connect adaptations and biodiversity. A puzzle exercise is used to demonstrate how biodiversity provides opportunities for survival.

Objectives: Upon participating in the following activity related to the reading of *Helping Brother Rhinoceros*, the participant will be able to:

Develop a labeled picture or diagram to illustrate how the animal helpers in the story solved their problem by working together using the specific skills each of them had.

Distinguish unique characteristics or behaviors of organisms that help them survive in their environment and *identify them as adaptations.

Associate the variety of organisms (*biodiversity) in nature with the variety of unique physical characteristics or behaviors that provide them with different survival strategies.

*Recommended for Upper Elementary (Grades 3 – 6) participants only.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for the *Next Generation Science Standards* that can be met using this activity to support instruction.

Materials:

Helping Brother Rhinoceros

Chalk/white board, covered bulletin board or chart paper

White paper

Crayons, markers, colored pencils

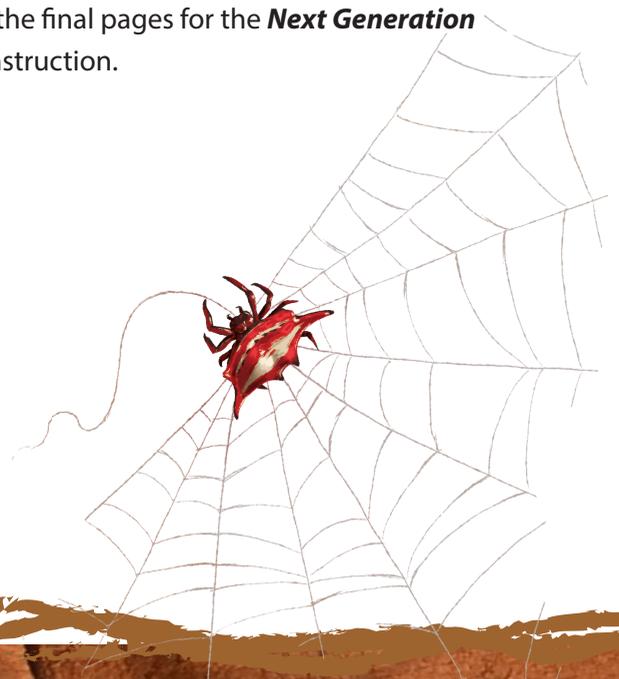
African Savanna Wildlife Guide Cards pages 2 – 8

African Savanna Ecosystem Puzzle – Appendix A – 2 pages

Scissors

Tape

Glue (preferably glue sticks)



Procedure: Complete Introductory Reading Comprehension prior to beginning.

1. After giving/listing the names of all of the “helpers” in the story, ask the participants to count and give the number of helpers.

This would be six if including Father Oxpecker for getting the helpers together.

2. Then ask them “Why were so many helpers needed?”

In this discussion it can be determined from the story that many different skills/talents were needed to solve the problem. Each helper supplied only one of the needed skills.

3. Once this reason has been established, have the participants give the skill that each helper supplied and how each skill was used to solve the problem with Brother Rhinoceros. Have them refer to the illustrations if they need a quick reminder. This can be done orally and/or in writing as a chart.

Answers and/or chart would include:

<i>Sister Vervet Monkey</i>	<i>Tie things using fingers</i>	<i>Tied rope around body</i>
<i>Grandfather Giraffe</i>	<i>Very tall, long neck</i>	<i>Neck used as a bridge to get over to Brother Rhinoceros</i>
<i>Grandmother Spider</i>	<i>Spin silk</i>	<i>Provided silk threads to make into rope</i>
<i>Brother Weaverbird</i>	<i>Braid, knit, interweave</i>	<i>Braided silk threads into rope</i>
<i>Mother Elephant</i>	<i>Very strong</i>	<i>Pulled on rope</i>

4. If not considered or offered in Step 3, ask the participants to consider the skill Father Oxpecker had that he used to help Brother Rhinoceros and have them explain how that skill contributed to solving the problem.

Include this in the chart as follows:

<i>Father Oxpecker</i>	<i>Able to fly</i>	<i>Flew out to search for and guide all helpers back to Brother Rhinoceros</i>
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5. From the chart, have the participants put the actions of helpers in the sequence used to solve the problem. Again, have them refer to the book illustrations for reminders.
6. Using the chart and sequence, have participants draw a picture or make a diagram with labels, individually on sheets of paper, or as a group on a chalk or white board, showing how each of these skills was put together with the others to help Brother Rhinoceros. This story summary drawing/diagram can be referenced during the rest of this activity and other activities of this collection.
7. When the drawing or diagram is completed, it can be discussed with participants, encouraging them to analyze it by identifying the way each of the characters was involved in solving the problem together. Specific emphasis should be placed on the skill that each character used and how each character was involved with the others to complete the task.
8. Explain to the participants that each character in the story used a specific skill that only it had to help Brother Rhinoceros, but it used the skill in a different way than how it actually uses it in its daily life. Ask the participants to propose how each of the animals might use its special skill to help them live.

In preparation for the next step, the following should be completed and method of presentation decided according to the abilities and number of participants:

Groups of readers: Distribute to participants pages 2 – 8 of the African Savanna Wildlife Guide Cards that are specific for each of the animals involved in the story. Depending on the size of the group and the availability of materials, these can be provided to each participant to work on individually or they can be shared in small groups of less than seven. If group work is selected, the group members can work individually by passing each card on to the next person until everyone has seen all cards or they can work as a group to collect the information needed with each member responsible for one or two of the cards and then all members reporting out to the group.

Groups of non-readers and/or early readers: The presenter should access pages 2 – 8 of the African Savanna Wildlife Guide Cards to read and show to participants going forward with this exercise. The presenter will need to assess participants' abilities to determine how much of the information to share on each card and what explanations need to be given in order for them to complete this task successfully so that they are appropriately challenged, but not overwhelmed.

9. First, have the participants identify the five animals that had the working roles in rescuing Brother Rhinoceros by selecting the appropriate cards from the seven they have been given or shown. (Spider, Weaverbird, Vervet Monkey, Giraffe, Elephant.)
10. Next, explain to the participants that each Wildlife Guide Card contains many facts about the life of one of the animals that were in the story. Tell them that within those facts the skill that each animal used to help Brother Rhinoceros is given along with how that animal uses that skill in its daily life to survive. Ask them to read or listen closely as each card is read to find where the skill is described and how the animal uses it in its life.

The following skill uses are given on the African Savanna Wildlife Guide Cards:

Vervet Monkey Uses its fingers to collect food.

Giraffe Uses its long neck and legs to reach high into the trees for food.

Spider Spins silk to make webs used to catch other insects for food.

Weaverbird Uses its weaving ability to weave delicate nests that hang from tree branches to protect them and their offspring from predators.

Elephant Uses its strength to dig for water and down trees to get food and water. Also use their strength to defend themselves and their young from predators.

11. During the discussion, when each of the animals' specific skills mentioned in the story are identified and discussed, ask the participants if the skill that was described in the story for each animal was the only skill that animal has in nature, according to the African Savanna Wildlife Guide Cards.

The answer to this question should be no.

12. Agree that indeed all organisms have many special skills that help them survive in their environment.
13. Explain to the participants that these special skills can be either a behavior, such as the way the vervet monkey uses its fingers, or a physical characteristic, like the long neck and legs of the giraffe.
14. When that correlation is made, help them identify at least one more of the other special skills and uses that are given for each of the story's animals on the guide cards and ask them to say whether it is a physical characteristic or behavior.

*EXTENSION FOR GRADES 3 – 6 (Middle School Transition) ONLY: Steps 15 – 17

15. At this time introduce the term **adaptation** to the participants using the following definition:

A characteristic or behavior that organisms use to help them survive in their environment.

16. The participants should then be asked to search the guide cards and give examples of other adaptations that the animals have and defend their choices by explaining how they help the animal survive in its environment.

17. To help reinforce the concept that all organisms have adaptations, allow the participants to explore the physical characteristics and behaviors on the guide cards of the remaining two animals from the story, the oxpecker and rhinoceros. Ask them to identify examples of physical characteristics or behaviors that can be considered adaptations of these two animals and make a record of them for each animal.

18. To help participants visualize the relationships discussed and draw conclusions from this activity, the following exercise uses a simple puzzle (Appendix A – 2 pages) to summarize what has been presented. This exercise can be done individually, in pairs, or in small groups to conserve materials and time as needed. If possible, copy Appendix A on heavier paper such as card stock to increase maneuverability and durability during the exercise.

(If more permanent sets of puzzle pieces are desired for multiple-time use, the puzzle piece pages can be copied, laminated, then each set cut out and all of the pieces for one puzzle put into an envelope. This will eliminate cutting out the pieces in Step A below and tape should be used to attach the pieces to the white paper in Step C.)

(This exercise can be adapted for PRE K – GRADE 2 by using special skills when talking about adaptations and helping the participants with the adaptation words on the puzzle. It may help to enlarge the puzzle pieces and cut them out for each group prior to presenting and/or modeling the exercise for the participants using a transparency copy of the puzzle pieces and an overhead projector.)

A. Distribute copies of the two pages of Appendix A – African Savanna Ecosystem Puzzle that has all of the separated puzzle pieces arranged. Have the participants cut out the pieces and place them on a flat surface.

- B. Explain to them that there are three types of puzzle pieces: (1) those with the African savanna background picture with a rhinoceros in a mud patch, much like the one described in the story, that are on the first page; (2) those with helper animal pictures from the story; and (3) those with words giving adaptations (special skills) of the helper animals, both on the second page. Have them sort the pieces into these three groups.
- C. When they have the groups of pieces sorted, remind them that all of the animals in the story live together in the African savanna ecosystem. Tell them that they will need to put together the puzzle pieces from the first page of Appendix A to make the background of the savanna so that there is an environment for the helper animals to have a place to live. Have them do this by arranging the pieces on a sheet of white paper and then gluing them down once all of the pieces are in position. This will be in a landscape orientation. (Note: These pieces are at the top and in the middle of the puzzle; the puzzle will be solved from the inside out. For reference, a picture of the completed puzzle can be found in the ADDITIONAL INSTRUCTIONAL RESOURCES section for this activity.)
- D. Next, explain to participants that the helper animals could not live in the savanna without the adaptations (special skills) that they have. Have them match each of the adaptations (special skills) puzzle pieces to the puzzle piece of the helper animal that has the adaptations (special skill). When matched correctly have them connect the pieces using tape to hold them in place.
- E. Finally, once the adaptations have been identified and correctly connected to the animal helpers, tell participants that with those adaptations the animals can now fit into their environment of the African savanna. Have them connect each of the combined puzzle pieces of an animal with its adaptations into the background picture that is already constructed on the white paper to finish the complete picture. When the correct positions for the animals are found have participants glue them in place as was done with the background pieces.



19. With the puzzle completed in front of the participants, ask them to respond to the following sequence of questions:

(These can also be reworded and/or adapted to summarize and conclude for PRE K – GRADE 2)

- a. Why are adaptations (special skills) important to organisms in nature?
They help them survive in their environment.

- b. How is it helpful for organisms to have many adaptations (special skills)?
The more adaptations organisms have the more able they are to survive in different situations.

- c. Do all organisms have the same kind of adaptations (special skills)?
No, each organism has its own (unique) adaptations.

- d. With each different organism having their own different set of adaptations (special skills) what does that mean about the ways different organisms survive in their environment?
They all use different ways to survive.

- e. Why is it helpful for different types of organisms, living in the same place, to have different types of adaptations? (Encourage them to think about the puzzle exercise by asking if the puzzle would have been complete if all of the animals had been connected to the same adaptation puzzle pieces.)
The different types of adaptations that each different organism has give it an advantage to “fit into” and survive in its environment in its own way that is not like any other organism.

(The presenter can further explain that the organism with its adaptations is like being a piece of a puzzle in its environment.)

For GRADES 3 - 6 (Middle School Transition), end this discussion by stating that the term for variety (different types) of organisms is **biodiversity**.

Evaluation Exercise:

Have participants give five examples of adaptations (special skills) that organisms have and explain how they help the organism survive in its environment.

ACTIVITY 2: A PLACE FOR EVERYONE, EVERYONE IN THEIR PLACE

Levels: PreK – Grade 6 (Middle School Transition)

Subject Area: Environmental Science

Duration: 1.5 – 2 hours (depending on the extent of coverage/level desired)

Setting: Classroom

Skills: Reading Comprehension, Analysis, Research, Problem-solving

Summary:

The concept of ecological niche is developed in this activity using the rescue problem-solving done in the story as a framework. Participants are asked to actively re-create the rescue of Brother Rhinoceros to experience having a role in a large system, which is then used to explain each organism having a role in the ecosystem.

Objectives: Upon participating in the following activity related to the reading of *Helping Brother Rhinoceros*, the participant will be able to:

Analyze a labeled picture or diagram that illustrates how the animal helpers in the story solved their problem and use it to re-create the process by participating in a physical reenactment (model) to help evaluate the role of each helper in the process.

Determine that the specific physical characteristics or behaviors that organisms have that help them survive in their environment, or their *adaptations, allow them to perform a specific role or job in their environment, known as a *niche.

Recognize that organisms have specific roles or *niches in their environment that are interrelated and are therefore dependent on each other.

*Identify what is included in an organism's niche and distinguish some of these using information about various organisms.

*Recommended for Upper Elementary (Grades 3 – 6) participants only.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for the *Next Generation Science Standards* that can be met using this activity to support instruction.

Materials:

Helping Brother Rhinoceros

Skeins of thick yarn (optional)

Long pole or broom with a giraffe face attached to the end (optional)

African Savanna Wildlife Guide Cards

Procedure: Complete ACTIVITY 1 prior to beginning.

PRESENTATION NOTE: Although the following procedure is written for upper elementary (Grades 3 – 6) participants, the beginning steps can be adapted for presentations with lower elementary participants (Pre-K – Grade 2) by using the phrase “special skill(s)” in place of the term “adaptation(s)” in discussion.

1. As a way of reviewing the story and introducing the general concept to be developed in this activity, have the participants review the story summary drawing/diagram they made in Step 6 in ACTIVITY 1 illustrating the plan devised by the animal helpers to rescue Brother Rhinoceros. Briefly talk about how the adaptations of all of the organisms were used and sequenced together to successfully complete the goal as a team.
2. To help further develop this idea, and give participants the opportunity to actively experience the team problem-solving process that has been described, have them re-create the rescue of Brother Rhinoceros from that drawing/diagram with each participant taking on the identity of one of the characters. This will give participants (especially younger ones) a more active way to get the “feel” of what was involved in this team effort. To enhance the experience, a few skeins of thick yarn to represent streams of silk to braid into a rope, and a long pole or broom with a giraffe face to represent the giraffe’s neck can be supplied as props to help physically identify the roles and the connection of actions to others. Every participant should have an active role. Large groups should be divided into small groups so that every participant is able to contribute as one of the seven characters, including the rhinoceros.
3. Upon completion of Step 2 each participant should be asked to explain the role of their character including the adaptation they used, with whom they had to work to complete their task, and how their particular skill contributed to their task and the successful outcome. This can be done orally in small or large groups and/or individually in a writing assignment.

4. Further discussion of this exercise should start by reviewing the adaptations that each of the helpers contributed to the rescue, then ask the participants to answer the following:

- a. How did having a large number of different organisms with different adaptations help to rescue Brother Rhinoceros?

There were many adaptations available to use to help develop a successful rescue plan for Brother Rhinoceros.

- b. Would Brother Rhinoceros have been rescued if one of the helpers with their adaptation was not able to do his specific task or wasn't available to do it?

Probably not, since each had a very specific part that depended and was dependent on other helpers to complete. Also they had already determined that none of them could help on their own.

5. Summarize by saying that because of their adaptations each helper was able to contribute a specific task or job that, when combined with the other helpers, rescued Brother Rhinoceros.

6. Explain that the same thing happens with organisms in nature. All of the adaptations that each organism has to help it live in its environment makes it able to do specific jobs that, when interacting with other organisms and their environment, gives them a purpose or role in the place where they live. It is how the organism contributes to its surroundings. Because each organism has unique adaptations, their role and contributions are different from any other.

Thought Questions for Discussion:

Why is it helpful for many different organisms living together in the same place to each have many different adaptations (special skills)? (Have the participants think about the problem solving done in the story.)

The many different adaptations (special skills) of the many different organisms give the organisms many different ways to live with many different roles in their shared environment.



*EXTENSION FOR GRADES 3 – 6 (Middle School Transition) ONLY:

7. An example of this concept can be developed from the story. Ask the participants to think about the story to answer the following questions:

- a. Which of the other animal helpers had the same adaptations to perform the same task as Father Oxpecker (flying off to gather all of the other helpers) to rescue Brother Rhinoceros?

Brother Weaverbird has the ability to fly.

- b. Why didn't that animal helper perform that task?

Brother Weaverbird was not with Brother Rhinoceros when he got stuck so he didn't know about the situation.

8. Have the participants use the story and the Wildlife Guide Card about the oxpecker to explain how Father Oxpecker's other adaptations put him in the position to perform the task that he did instead of any other animal.

Father Oxpecker was with Brother Rhinoceros because oxpeckers and rhinoceroses have a relationship in nature that causes them to be together, so when the rhinoceros got stuck in the mud, the oxpecker was the only one around who knew of the problem and could fly off to get help. In nature oxpeckers are found with rhinoceroses because they clean the rhinoceros's skin, picking out ticks and other parasites while the oxpecker feeds on the blood from those parasites and picking at scabs on the rhinoceros's back which the rhinoceros allows.

9. Explain to the participants that even though the oxpecker and weaverbird in the story had some of the same adaptations, the oxpecker had some different ones that made it more able or available to do a specific task than the weaverbird to help the rhinoceros. In other words, the oxpecker was there and the weaverbird wasn't. Remind them that the weaverbird was also able to contribute in a way that the oxpecker wasn't by being able to weave. So they both contributed but in different ways because of different adaptations, even though they both had some similar adaptations giving them the ability to fly. (Here, there may be an opportunity to review adaptations by asking the participants what characteristics both birds have that give them the ability to fly.)

10. Then, have the participants consider the story and guide card again and ask them to explain why Brother Rhinoceros and Father Oxpecker are said to be friends.

They are said to be friends because they have a relationship that depends on them being together. The oxpecker gets his food from the rhinoceros without bothering the rhinoceros, while helping to keep the rhinoceros's skin free of ticks. The oxpecker also acts as a security guard by shrieking when it senses danger which warns the rhinoceros.

11. Explain to the participants that the role of the oxpecker in its relationship with the rhinoceros is an example of one part of what is called its niche, which is its role or job in its environment.

Explain that a **niche** of an organism includes:

how it passes energy through its environment, which includes how it gets its energy by

- a. **what it eats**
- b. and where it sends it by **what eats it;**
- c. how it **interacts with other organisms;** and
- d. its **role in recycling nutrients** by returning the nutrients from its food back into the environment.

Reemphasize that what gives the oxpecker its role are the physical characteristics and behaviors that it is using to help it survive in its environment, which are considered adaptations. Ask the participants to identify those behaviors and physical characteristics that are the adaptations that determine the oxpecker's niche.

Possible responses include:

It gets its food by picking out ticks and other parasites while it feeds on the blood from those parasites and from picking at scabs on the rhinoceros's back.

It protects itself against possible predators by shrieking when it senses danger.

It has large claws that help it grab onto the back of the rhinoceros.

It is interacting with the rhinoceros, traveling on its back.

It recycles nutrients by digesting the ticks and blood and excreting the wastes.

12. Remind participants that the oxpecker is not acting alone in this case. The oxpecker's actions involve an interaction with the rhinoceros. This interaction is also determining the oxpecker's niche and in turn the rhinoceros's niche as well. Just as the oxpecker, the rhinoceros has various physical characteristics and behaviors that are adaptations that determine its niche. Have the participants refer to the rhinoceros facts pages at the end of the book and the Wildlife Guide Card for the rhinoceros to identify some of its adaptations that would determine its niche. For identification purposes, it should be noted that the rhinoceros pictured in the book is a black rhinoceros, which is the more common of the different species.

Possible responses include:

It is a herbivore, its mouth, teeth and other digestive organs allow it to eat only plants.

It has a hooked lip which is used to eat mostly leafy plants like trees and shrubs; this makes it a browser.

It provides food (blood) to ticks and the oxpecker.

It has very thick skin which allows it to withstand the claws of the oxpecker without being bothered.

The oxpecker interacts with the rhinoceros by providing an alarm because it shrieks when predators are close, thus warning the rhinoceros of danger as the two travel together.

It recycles nutrients by digesting the plants it eats and excreting the waste.

13. Further exploration of the concept of niches can be done with other organisms. Have the participants choose one or more African Savanna Wildlife Guide Cards from all of those remaining. The number of guide cards for each participant will be determined by the number of participants. All participants should have different organisms and all guide cards should be distributed.
14. Ask participants to review the information for each animal identified on each card and make a list of the physical characteristics and behaviors for each animal that would determine the niche of each. Remind them what information they should be identifying by reviewing, both orally and in writing, what is included in determining an organism's niche. During this review it may be necessary to guide the participants to sections on the cards where they may find each of these items, depending on their information gathering background and abilities. Depending on the size of the group and the availability of materials the participants can work individually or in groups to share the cards and work on the assignment.
15. When enough time has passed to complete the information gathering, have the participants report on what they have found. Have the participants listen carefully to each report to determine if their organisms have any similarities to other organisms being presented. Remind them that all of these animals live in the African savanna. If needed, the presenter can guide the participant presenter by asking them to respond to the following:
- What does this animal eat?
 - What eats this animal?
 - How does this animal interact with other organisms?
 - How does this animal recycle nutrients?
16. At the end of these short reports have the participants discuss any similarities they noticed and whether their organisms were mentioned in other reports. Have them explain any overlap or connection between the organisms' niches.



17. After this discussion, use the following question sequence to guide the participants' thinking so that they can analyze and draw conclusions from this activity:

- a. Other than an organism having specific behaviors and physical characteristics to perform a specific role or niche in its environment, what else must be available for it to be able to do its job?

Other organisms with whom they can interact.

- b. If all organisms' niches include interactions with other organisms, what does this mean about the niches of all of the organisms living in the same place?

It means that all of the niches overlap with each other or are connected (or interrelated) to each other by those interactions.

- c. With all of the niches of organisms being connected by the interactions, what would happen if an organism was not able to interact?

The connections with that organism would be missing and the work in some parts of the ecosystem would not be able to happen as it did before.

- d. Why are the connections between organisms important for the ecosystem where they live?

All organisms depend on interactions with other organisms to perform their role or fill their niche. No organism can complete its job properly without an interaction with others.

18. To conclude, have the participants refer back to the beginning exercise of this activity where they re-created the rescue plan of Brother Rhinoceros. Tell them to think about how that plan worked in terms of how niches operate within an ecosystem. Have them identify the parts of the rescue plan that would represent the niches and what represented the connections. It might also be beneficial to review the questions from Step 4 and the Thought Question after Step 6 for further discussion to include the concept of niches.

Evaluation Exercise:

In pairs or small groups, have the participants create diagrams to illustrate how niches of organisms in an ecosystem can be interrelated and interdependent.

ACTIVITY 3: CAUGHT IN A WEB OF LIFE

Levels: Grades 3 – 6 (Middle School Transition)

Subject Area: Environmental Science

Duration: 1.5 – 2 hours (depending on the extent of coverage/level desired)

Setting: Classroom

Skills: Research, Analysis, Predicting, Model making

Summary:

The interdependence of organisms in the form of food relationships is explored in this activity in connection to an organism's niche. Participants construct food chains and then food webs and look at the implications of the interrelated dependence of organisms in an ecosystem.

Objectives: Upon participating in the following activity related to the reading of *Helping Brother Rhinoceros*, the participant will be able to:

*Construct various food chains and a food web to show how energy flow proceeds through an ecosystem and connects many different organisms.

*Provide examples of various types of organism interactions and relationships.

*Infer the need to conserve a variety of organisms, or biodiversity in an ecosystem in order to maintain the interrelated dependence of organisms.

*Recommended for Upper Elementary (Grades 3 – 6) participants only.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for the *Next Generation Science Standards* that can be met using this activity to support instruction.

Materials:

Helping Brother Rhinoceros

African Savanna Wildlife Guide Cards

Chalk/white board or covered bulletin board

White paper

Crayons, Markers, Colored pencils



Procedure: ACTIVITY 1 should be completed prior to beginning and it is suggested that ACTIVITY 2 be completed as well.

PRESENTATION NOTE: Before beginning this activity the participants should have one or more African Savanna Wildlife Guide Cards to use, either by assignment or of their own choosing. If ACTIVITY 2 was completed prior, it is advisable to let each participant use the guide card(s) of the animals they had in that activity to maintain continuity of instruction.

1. Explain to the participants that food interactions between organisms, what they eat and what eats them, plays a large part in an organism's life and determines its role in its environment, also known as its niche. Explain that these interactions when put together in sequence describe the food chains in which these animals interact and how they pass energy in the form of food through the ecosystem of which they are a part.
2. Bring participants' attention to the African Savanna Wildlife Cards that they have and point out where they can locate the food interaction information (What They Eat and What Eats Them).
3. Depending on the background of the participants with this topic, the presenter can decide how to model food chain diagrams and the vocabulary that is used to describe the interactions. The presenter should use the rhinoceros wildlife card to explain and model this. During the modeling use simple vocabulary to emphasize that producers (plants) start the flow of energy from the sun by producing food that is then transferred to a consumer that is usually a herbivore (those that feed on plants) and then onto a second consumer that uses the herbivore for food. For the rhinoceros this can look like the following:

SUN —> Shrub Leaves —> Rhinoceros —> Tick (Parasite) —> Oxpecker
(Producer) (1st Consumer) (2nd Consumer) (3rd Consumer)
4. During modeling, the presenter may take the opportunity to explain a parasitic relationship and possibly its relation to other symbiotic interactions depending on the level of participants. Predator/prey interactions can also be discussed in this context. Reference to the rhinoceros facts pages at the end of the book can help distinguish a herbivore browser from a grazer. All of these interactions are integral in defining an organism's niche.
5. When sufficient background is given and modeling is completed, have the participants draw a food chain diagram for each of the animals on the African Savanna Wildlife Cards they have been assigned or chosen, while monitoring their progress in case there are questions.

6. Once the diagrams are completed, explain to the participants that the next step will involve showing these food chain diagrams using the pictures on the guide cards, but because the guide cards are of animals only, ask them to identify what is missing that they will need to put together a complete food chain diagram. They should answer that plants are needed.
7. Explain that they will have to create guide cards for the plants so that they have producer pictures for the transfer of sun energy. Give them white paper and crayons, markers, or colored pencils to draw the plant pictures they need for their specific food chains.
8. Next, with a picture or drawing of the sun at the top of a chalk/white board, ask all of the participants to place their producer pictures in a horizontal row under the sun and draw a line from the sun to each picture. Explain that this will represent the transfer of light energy into food energy through photosynthesis that starts the flow of energy in the food chain. Have the participants analyze the plant pictures supplied to see if there are similarities and/or duplicates that may be able to be grouped or eliminated to consolidate the offerings.
9. Then, ask participants to identify themselves by raising hands if they have an animal guide card that is a herbivore or first order consumer in one or more of their food chain(s). Explain to all that these consumers will be the first additions to the food chain diagrams. Using the rhinoceros guide card and rhinoceros food chain diagram from the modeling in Steps 3 and 4, show and explain to the participants the following sequence they will be asked to follow:
 - A. Explain that, one at a time, each participant who has a herbivore, will tell what their animal is and what producer they consume.
 - B. They will then place their guide card on the board underneath the appropriate producer and draw a line from the producer to their card.
 - C. Next, they will state if they have an animal consuming it in their food chain and, if so, they are to ask if anyone has that animal guide card.
 - D. If a participant has that animal they will add that card underneath their animal and again add a line from first order consumer to second order consumer.
 - E. If no participant has that animal then anyone who has any other animal that could be a second order consumer can volunteer to add their card to complete the chain.

- 
- F. If the participant with a second order consumer has a food chain diagram with a third order consumer, they can then ask for a participant with that animal and complete the same addition procedure as those before had done.
- G. This will continue until the food chain comes to a tertiary consumer or apex predator, and then a new herbivore is introduced.
10. During this process added food chains may intersect with those already there. In that case all that needs to be added would be a line from an added animal to the one organism that is already there. As this continues with each herbivore, remind the second order consumer participants that they may have another food chain they diagrammed for their animal and that they will have a chance to contribute that at the end.
11. When all of the initial herbivore food chains are offered, as promised, ask the participants if any of them have an animal that has not been included in a food chain on the board or any other food chain sequences that were not presented. Again, one at a time have them add their information to the board diagram.
12. In the end, there should be a webbed diagram of all of the food interactions that could occur with all of the organisms. Ask the participants to give their observations and thoughts about what happened in the exercise and the result. Explain to the participants that this diagram represents a possible food web, or a natural system of interconnections of food chains showing how plants and animals are connected in many ways. It shows the possible food interactions that could occur in the African savanna ecosystem.
13. To help participants further explore the implications of this system, extend this exercise by asking the participants to imagine removing one of the organisms from the web and predict what that would do to the interactions and how things would change in the savanna. Have them concentrate on the interactions that will be affected and how the populations of other organisms would change and what that change would mean to other populations as well.

14. Test out some of the predictions by physically removing an organism's guide card from the web and then removing any connecting lines. If another organism no longer has a connecting line then it also needs to be removed along with any remaining lines that it may still have. This goes on until there are no longer any unconnected pictures. If possible, try to test an organism from each trophic level (producer, first order consumer, second order consumer) to see the difference in change.
15. In conclusion, have participants reflect on what the disappearance of even one of the species in this web of life would mean to the entire ecosystem. Ask them to make comparisons with the story and explain the importance of maintaining or conserving a variety of organisms, or biodiversity, in an ecosystem

Evaluation Exercise:

Have each participant construct a small food web diagram with three interconnected food chains, then tell them to create a circumstance that would cause one of the species to be eliminated. Ask them to write a paragraph describing the circumstance and how it would affect the remaining species.



ACTIVITY 4: WHO NEEDS HELP?

Levels: Grades 3 – 6 (Middle School Transition)

Subject Area: Environmental Science, Geography, Math

Duration: 1.5 – 2 hours (depending on the extent of coverage/level desired)

Setting: Classroom

Skills: Research, Data Analysis, Drawing Conclusions

Summary:

This activity introduces participants to factors that may have an impact on a species' survival and has them use information about various species to evaluate their risk of becoming endangered. They are also asked to analyze the factors to determine ways to help species at risk.

Parts of this activity contain information and exercises adapted from National Wildlife Federation's "At-Risk Species" Lesson found at:

<https://www.nwf.org/~media/PDFs/Be%20Out%20There/Schoolyard%20Habitats/AtRiskSpecies2.pdf>

Objectives: Upon participating in the following activity related to the reading of *Helping Brother Rhinoceros*, the participant will be able to:

- *Assess the at-risk status of the rhinoceros by using and evaluating map data of the rhinoceroses' current and historical range.
- *Define a species as a closely related group of organisms that share common characteristics and are alike in some manner.
- *Differentiate between species that are threatened, endangered, or extinct.
- *Identify biological and human-influenced factors that make species at risk of becoming endangered.
- *Determine how likely a particular African savanna species is to become endangered by evaluating each species as to its possibility of being affected by the identified risk factors.
- *Propose actions to address the identified risk factors that may help species be less affected.
- *Recommended for Upper Elementary (Grades 3 – 6) participants only.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for the *Next Generation Science Standards* that can be met using this activity to support instruction.

Materials:

Helping Brother Rhinoceros

African Rhinos: Conservation Crash poster

African Savanna Wildlife Guide Cards

Chalk/white board, covered bulletin board, or chart paper

Chart paper (one sheet for each group)

White paper

Markers



Procedure: Complete Introductory Reading Comprehension prior to beginning. It is suggested that Activities 1 – 3 precede this activity for more context, but it can be done independently.

1. To begin this activity, explain to the participants that this story tells about helping Brother Rhinoceros out of a mud patch, but in nature, rhinoceroses need much more help than that. Have them turn to the “Meet the Rhinos of Africa” page at the end of the book.
2. After the participants read this two-page section, if they have not already, direct their attention to the map of Africa on the bottom middle of the first page. Ask them to generally explain what this map is showing. It may be necessary to explain the term range and discuss compass directions for a basis of further discussion. This would also be a good opportunity to do a brief African continent geography overview. Emphasis, though, should be on the four sets of data displayed on the map.
3. Start the participants analyzing the map data by having them explain the terms current and historical as they relate to each other. Then have them pair current and historical for each of the two types, or species, of rhinoceros by identifying which colors are to be compared with each other; black with orange, and white with green.
4. In small groups have the participants discuss the data for each of the rhinoceros species and make an assessment of what the data says about the help rhinoceroses need.
5. When completed ask for volunteers to report their group’s findings. Give the opportunity for all to discuss and come to a consensus on the status of the current rhinoceros populations.
6. At the end of this discussion ask the participants to consider what would be causing the shrinking range and populations.

7. Immediately distribute a copy of the *African Rhinos: Conservation Crash* poster to each of the small groups and have the participants investigate the information to determine the reasons for “the crash”.
8. When participants have been given enough time to investigate, begin a discussion about the reasons presented and identify some of the vocabulary that is associated with them, including “extinct”, “species”, and “poaching”, to determine definitions. Record these for all to see and refer to going forward.
9. During this discussion have the participants review some of the physical characteristics and behaviors, or adaptations, of the rhinoceros that are included on the poster and identify reasons scientists are concerned about rhinoceros populations.
10. Finally, explain to the participants that although human-influenced factors are the main reason for the rhinoceros being considered endangered, or at risk of becoming extinct, there are also biological factors that may have made it more at risk than other species.
11. Have participants think of other endangered species and have them share any of their ideas of what other factors could make species more at risk than others. Make a list as ideas are shared.



12. Once the participants' list is established, provide them with the following information from the National Wildlife Federation about possible physical characteristics or behaviors of an organism that make it more at risk of becoming endangered:

(Source: <https://www.nwf.org/~media/PDFs/Be%20Out%20There/Schoolyard%20Habitats/AtRiskSpecies2.pdf> Accessed February 2019)

- A. **Specialized (diet and/or habitat):** Some animals are specialists because they eat only one type of food. These animals are especially vulnerable if their food source is destroyed. Also, some species are specialists because they can only live or make a nest in a very specific location, such as high altitude forests or vernal pools (temporary small wetlands). These types of specialists are also vulnerable to disturbance.
 - B. **Large Size:** Large animals, such as bears, elephants, and tigers, tend to require a large amount of habitat in which to live and find all their basic survival needs. If habitat loss limits the areas in which they can live, these animals may not be able to find enough food or territory to survive.
 - C. **Slow Reproductive Rate:** Some species only produce one offspring at a time, and have long gestation periods. If the number of individuals of these slow breeding species, like condors, elephants, or bears, decreases, it takes a long time for the population to recover.
 - D. **Migratory Lifestyle:** Animals that migrate need healthy habitats at both ends of their journeys and safe places to nest, feed, and rest along the way. They are therefore more susceptible than non-migratory animals to habitat destruction because they depend on multiple areas, each with its own conservation challenges.
 - E. **Perceived as Valuable by Humans:** Many animals and plants, and products made from them, are sold for their beauty, use in medicines, fashion, and the pet trade. There are both national laws and an international treaty controlling this trade (the Convention on International Trade in Endangered Species), but many species are still endangered by human use.
 - F. **Perceived as a Threat:** Large predators, such as wolves, may be perceived by humans as a threat to livestock. Grizzly bears and large cats that come into contact with humans are often feared by people, even in cases where they are not posing a significant danger.
13. After these factors have been fully explained to the participants have them identify which of them are biological (living) factors (*A, B, C, D*) and which are human-influenced (*E and F; although A, B and D can have a human influence when it comes to habitat loss or destruction*). Write all of the headings of these factors for all to see.

14. From the list, have participants determine which of the factors they think apply to the rhinoceros.

At this point, B. Large size, and E. Perceived as Valuable by Humans should be given.

15. Next, distribute the African Savanna Wildlife Guide Card for the Black Rhinoceros on page 1. Tell participants to read the information on that card to see if there is any more information that would add to their list of factors for the rhinoceros.

C. Slow Reproductive Rate should be added.

16. Distribute a large sheet of chart paper to the small groups already established and have each group make a table on it as shown below:

Species Name	A. Specialized Diet or Habitat	B. Large Size	C. Slow Reproduction Rate	D. Migratory Lifestyle	E. Valuable for Humans	F. Threat to Humans

17. With a copy of this table displayed for all to see, together with the participants explain the procedure and show how to complete the table for the rhinoceros in the first row using the following steps:

A. Put Rhinoceros as the species name in the first box.

B. Explain that for each of the factors identified by the headings over the following boxes they are to evaluate the risk of the rhinoceros becoming endangered due to that factor according to the following scale:

- 0: no risk from that factor
- 1: low risk from that factor
- 2: medium risk from that factor
- 3: high risk from that factor

C. Go through each of the factors one at a time having the groups discuss and then report out their numerical evaluation with their reasons for that assessment. If there is some variation in the assessments have them come up with an average value.

18. Distribute at least 5 other African Savanna Wildlife Guide Cards to each group and have the groups complete evaluations for each of them on their group chart according to the same procedure as was completed with the rhinoceros. Remind them to look for relevant information on the cards as was done with the rhinoceros and then discuss as a group each of the factors for each of the animals. Tell them to be ready to defend their assessments with facts on each animal that informed their conclusions.
19. As groups finish their evaluations have them post their tables where all can see when they defend their conclusions.
20. When all groups' tables are posted have a representative from each group present their conclusions with reasons. At the end of each presentation open the discussion to comments and questions from the other groups. It is at the discretion of the groups as to changing any assessments.
21. Bring this exercise to a close by having the groups add the values of each factor for each animal and record that number next to the name of the species. Ask them to explain what those numbers represent and the meaning of the size of that number in relation to what they determined about the risk for that organism of becoming endangered. Have them compile a list of those species that they determine would be at-risk and need to be helped.
22. Caution the participants that although these values are useful in directing attention to certain at-risk species, they are only estimates that they assessed by making judgements based on limited information. Also stress that the six factors that they used to make these judgements are not the only ones that could affect a species and it is difficult to actually determine all of the factors that would put a species in danger. Because of this, all of the conclusions are relative and conditional to numerous circumstances. There are many species at risk for many different reasons and there is no single species that is more endangered than another. (Some of the sources listed on each wildlife card have references to the actual scientific assessment of at-risk status of that animal. The presenter can decide if accessing the information to check participant assessments is desired.)
23. For a review of the six factors that were used in this exercise, assign one of the factors to each group and have the group discuss what actions they would propose to help a species that was at risk because of that factor. They should identify what kinds of things scientists and conservationists would be able to do to help and what they think they could do. After enough time for discussion have each of the groups report on what actions they propose to the rest of the groups.

24. In ending, have the participants discuss how these factor assessments can be used to help at-risk species and give reasons why they should be helped. If they have completed Activities 1 – 3, tell them to consider the effect on the savanna ecosystem if a species becomes extinct, or no longer available. All participants can be referred to the contents of *African Rhinos: Conservation Crash* poster used at the beginning of this activity for reasons as well.

Evaluation Exercise:

Have participants write a paragraph for each of three at-risk African savanna species, giving their unique physical characteristics and behaviors, explaining the factors that are causing them to be at-risk and proposing ways to help them.



ACTIVITY 5: HELP IS ON THE WAY

Levels: PreK – Grade 6 (Middle School Transition)

Subject Area: Environmental Science, Geography

Duration: 1.5 – 2 hours (depending on the extent of coverage/level desired)

Setting: Classroom

Skills: Reading Comprehension, Analysis, Research, Visual Arts

Summary:

Participants are asked to explore wildlife conservation issues related to those experienced by the rhinoceros in this activity. It is designed as the conclusion to the rest of the activities in this collection, as the concepts developed in the previous activities are impacted by those wildlife conservation issues and are the reason for developing an awareness of them and encouraging action.

Objectives: Upon participating in the following activity related to the reading of *Helping Brother Rhinoceros*, the participant will be able to:

Distinguish between wild and domestic animals in needs and treatment.

Identify respectful treatment of wild animals and defend the need for it.

*Recognize that the conservation problems experienced by rhinoceroses are caused by wildlife trade practices that are supported by human actions and are shared by many other wildlife species.

*Give examples of the difficulties that wild animals are experiencing and associate them with specific wildlife conservation issues.

*Analyze various methods being used to help conserve wildlife populations and determine how they are addressing wildlife conservation issues.

*Assess how human actions can assist with wildlife conservation methods and choose to promote responsible conservation practices.

*Recommended for Upper Elementary (Grades 3 – 6) participants only.

Refer to the ADDITIONAL INSTRUCTIONAL RESOURCES section on the final pages for the *Next Generation Science Standards* that can be met using this activity to support instruction.

Materials:

African Rhinos: Conservation Crash poster

Chalk/white board, covered bulletin board, or chart paper

Chart paper (one sheet for each group)

Chart markers

Post-It notes or various wild and domestic animal pictures and tape

Computer with Internet connection and digital projector

Drawing paper, poster paper, long roll of white paper for mural

Colored markers, crayons, paint

Glue

Scissors

Procedure: It is recommended that this activity be used as a conclusion to the series of other activities in this collection to ensure that participants have a fundamental understanding of the concepts integral to the need for wildlife conservation practices.

1. To introduce this activity's topic of wildlife conservation, use the story of Brother Rhinoceros to bring attention to the real plight of the rhinoceros in nature. Explain to participants that in the story Brother Rhinoceros needed help from his friends to get him out of the mud patch. They developed a plan to use all of their skills to rescue him. In nature rhinoceroses are also in trouble and need help from humans to make sure that they survive.
2. Distribute *African Rhinos: Conservation Crash* posters to small groups of participants. Tell them to study the poster to determine why wild rhinoceroses are in trouble and why there is concern. For non-readers have them look at the pictures while the presenter points to each set of pictures and reads the words to them.
3. After giving enough time to investigate the poster, discuss with the participants what the problem is and why it is important for humans to help the rhinoceros. This discussion should also present the opportunity to review the ideas that were covered in previous activities, such as every organism having a specific job, or niche, in its environment and what happens if that organism isn't there anymore or can no longer do its job, along with food interactions that would be affected. With upper-level participants the concept of *keystone* species can be included here, which is explained in the poster in relation to studies involving the white rhinoceros as a grazer keeping open grazing lawns and given as a reason to care about rhinoceroses becoming extinct.

4. At the end of the discussion, give each of the participant groups a sheet of chart paper with marker and ask them to think about the wild rhinoceroses' problem, just as the animal helpers in the story did. Then, together in their groups, discuss and record possible plans to help wild rhinoceroses. For non-readers do this as a large group and record ideas in words or pictures as appropriate on chart paper or board where all can see.
5. When each group has recorded their plans, tell them that they will return to those plans later in the activity for review and revisions.

In preparation for the next steps, the following should be considered and method of presentation decided according to the ability/grade level of participants:

The following steps will be using a video called "Keep Wild Animals Wild" produced by the International Fund for Animal Welfare (IFAW) organization. It addresses the topic of wildlife trade which is the basis for the rhinoceros conservation issues. The ultimate goal of this series of steps is for the participants to produce an individual drawing, small group poster, or large group mural addressing some aspect of the wildlife trade conservation issue and to advocate for wildlife conservation practices relevant to their level of comprehension.

There are three parts to this video so that it can be used for presentation at three different age/grade levels; PreK – Grade 2, Grades 3 – 4, and Grades 5 – 6 with parts being added at each subsequent level. PreK – Grade 2 is to view only the first part, with Grades 3 – 4 viewing the first and second part, and Grades 5 – 6 viewing all three parts. Because of the difference in topic coverage the presenter will need to choose the version of the video and the associated parts of the procedure relevant to the level of participant they are addressing.



Based on the grade level of participants and online video platform accessibility, choose one of the following versions of the classroom video from the International Fund for Animal Welfare's "Keep Wild Animals Wild" education pack by copying the site address into a web browser:

A. Pre-K – Grade 2 – Chapter 1

Vimeo: <https://vimeo.com/139950299>

YouTube: <https://www.youtube.com/watch?v=L3UXcaKoSVI&feature=youtu.be>

B. Grades 3 – 4 – Chapters 1 & 2

Vimeo: <https://vimeo.com/139951275>

YouTube: <https://www.youtube.com/watch?v=Pm5BSOVhT4U>

C. Grades 5 – 6 – Chapters 1 – 3

Vimeo: <https://vimeo.com/137283829>

YouTube: <https://www.youtube.com/watch?v=xA5-T0x8r8o&feature=youtu.be>

Due to differences in outcome expectations for each group, once your selection has been made, continue with the procedure steps choosing the appropriately lettered section (A, B, or C) associated with the video chosen, when present. If no lettered sections are given, then the step is to be completed with all levels. The exercises in these procedural step sections are adapted for this activity from the following sources:

A. Pre-K – Grade 2

IFAW Ages 5–7 Unit Lesson Plans "Keep Wild Animals Wild: Wonderfully Wild!," Lessons 1–2, pp. 2–4, copyright 2015.

(<https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/education-publications/us/us-aae15-keep-wild-animals-wild-lesson-plans-ages-5-7.pdf>)

B. Grades 3 – 4

IFAW Ages 8–10 Unit Lesson Plans "Keep Wild Animals Wild: Think Twice Before You Buy," Lesson 2, pp. 3–4, copyright 2015.

(<https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/education-publications/us/us-aae15-keep-wild-animals-wild-lesson-plans-ages-8-10.pdf>)

C. Grades 5 – 6

IFAW Ages 11–14 Unit Lesson Plans "Keep Wild Animals Wild: Break the Wildlife Trade Chain," Lesson 2, pp. 3–4, copyright 2015.

(<https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/education-publications/us/us-aae15-keep-wild-animals-wild-lesson-plans-ages-11-14.pdf>)

6. Explain to the participants that wild rhinoceroses are only one of many wild animals that have a problem like they have. Tell them that in this activity, just like the animal helpers in the story had to figure out how to rescue Brother Rhinoceros from the mud patch, they will be asked to figure out how to get others to help rescue animals that are in trouble in the wild by educating them about the problems that wild animals like the rhinoceros face and what can and is being done to help.
7. Tell participants that they will be using what they learned in the other activities they have completed combined with the new information from a video called “Keep Wild Animals Wild” in this activity to help explain to others what is needed to protect wild animals.
8. Preparation to view video:

A. Pre-K – Grade 2

- i. Have a brief discussion with the participants about what they think they will see in the video called “Keep Wild Animals Wild”.
- ii. Ask participants to quietly think about what the words “wild” and “not wild” mean. After they have been given enough time to reflect, have them choose a partner and share their thoughts. Then have partners share their ideas with the large group to get an idea of what is understood.
- iii. On a board draw a chart with two column headings, “Wild” and “Not Wild.” On sticky notes, write names of animals (e.g. horse, pig, rhinoceros, giraffe, chicken, cow, etc.) making sure to include those animals from the Brother Rhinoceros story along with domestic animals. For non-readers, pictures and tape can be an alternative to names on sticky notes.
- iv. After reading the name of each animal one at a time, have participants talk with their partner to decide whether that animal is wild or not wild. After giving a short time for partners to talk, ask participants to tell what they think by raising their hands for either wild or not wild. Ask for one person to explain why they decided on their choice for both wild and not wild answers if both choices were selected. Post the sticky note in the column that most participants chose. If the selection is not close to unanimous among participants, put a question mark beside the name to remind them of their uncertainty and tell them that they will come back to that animal after they view the video to see what they think. Continue this process for all of the animal sticky notes.
- v. When finished tell the participants that as they watch the video they should think about their selections. Tell them to pay attention to the wild animals shown in the video and have them think about what it means for them to be wild.

B. Grades 3 – 4 and C. Grades 5 – 6

- i. Start a discussion with all participants by stating that the video “Keep Wild Animals Wild” is about wild animals and wildlife trade. Explain that before watching it would be good to determine what they know and what they want to know about this topic. Tell them that in order to do this they will create questions about those things that they think they need to know to guide their viewing.
- ii. Ask them to state all of the words that are used to ask a question (who, what, when, where, why, how) and list them in a column on a board for all to see.
- iii. Next, show an example of what process will be used by offering a question that might be given using one of the interrogatives and following the pattern that will be used to complete the exercise by offering a question to the group, asking if anyone knows the answer, and determining from that whether the question should be recorded or not. Explain that only those questions without answers need to be kept as those are things that they need to find out.
- iv. Once the pattern is established by modeling have volunteers offer questions they have about wildlife trade that begin with one of the question words. When a question is offered, ask if anyone knows the answer to that question. If there is a correct answer to the question, ask for another question. If no correct answer is offered, write the question on the board next to the listed interrogative that it uses. This continues until all of the interrogatives have been used. These six questions will be the viewing focus for the participants.

9. Viewing video:

A. Pre-K – Grade 2

- i. Before showing the video, remind the participants about what they should be focusing their attention on by referring to the wild/not wild chart and asking them what they are to be looking for in the video.
- ii. It is suggested that for this age group, the video be played twice; once without any interruptions for general content, then on the second play, stopped at specific intervals to discuss certain content in more detail.
- iii. After the first viewing, ask the participants if they have thought differently about any of their selections for the wild/not wild chart. If so, ask them what they would change and why.
- iv. Before the second viewing, tell the participants that they will be watching the video again, but this time it will be stopped at certain places so that they can talk about what is happening.

- v. The following are the suggested stops and discussion questions offered by IFAW, the producers of the video:

Source: IFAW Ages 5–7 Unit Lesson Plans “Keep Wild Animals Wild: Wonderfully Wild!,” Lesson 2, pp. 3–4, copyright 2015.

(<https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/education-publications/us/us-aae15-keep-wild-animals-wild-lesson-plans-ages-5-7.pdf>)

1:10 – 1:19 (after the scene that shows the lion cub):

The lion cub in the video looks like a cute kitten, but how is it different?

7:00 – 7:12 (after the scene that asks about whether birds and tigers would make good pets):

Would these animals make good pets?

Would an elephant make a good pet? Why or why not?

Have one or two students respond.

Let’s see what might happen with an elephant pet... Return to video.

7:55 – 8:22 (after the scene with the animation of the child behaving poorly towards the animals):

Does this look safe for the animal?

Does it look safe for the child?

What do you think?

B. Grades 3 – 4

- i. Before showing the video, redirect participants’ attention to their viewing purpose by reviewing the specific questions they determined they needed answered in the group exercise. Then, to create a general viewing focus, remind the participants of what they have learned about animals in the African savanna ecosystem in previous activities and give them the following questions to think about while they watch:

Where do wild animals live?

What do all wild animals need to survive?

Why do wild animals need to be protected?

- ii. When showing the video, the following stops are suggested so that discussion can occur using the questions offered by IFAW, the producers of the video:

Source: IFAW Ages 8–10 Unit Lesson Plans “Keep Wild Animals Wild: Think Twice Before You Buy,” Lesson 2, pp. 3–4, copyright 2015.

(<https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/education-publications/us/us-aae15-keep-wild-animals-wild-lesson-plans-ages-8-10.pdf>)

7:00 – 7:12 (after the scene that asks about whether birds and tigers would make good pets):

Would these animals make good pets? Why or why not?

Does an elephant make a good pet?

Would any wild animal?

What do you think?

7:55 – 8:22 (after the scene with the animation of the child behaving poorly towards the animals):

Does this look safe for the animal?

Does it look safe for the child?

What do you think?

10:00 – 10:35 (after the scene where the wildlife trade products are shown):

Do people really need these things? Why or why not?

11:47 – 12:29 (after the scene showing the markets with wildlife trade products):

What if a shop sold turtle shell combs in your community?

What happens if customers buy the turtle shell combs?

What happens if they don't buy them?

How can our choices make a positive difference for wildlife?

C. Grades 5 – 6

- i. Before showing the video, redirect participants' attention to their viewing purpose by reviewing the specific questions they determined they needed answered in the group exercise. Then, to create a general viewing focus, remind the participants of what they have learned about animals in the African savanna ecosystem in previous activities and give them the following questions to think about while they watch:

Where do wild animals live?

What do all wild animals need to survive?

Why do wild animals need to be protected?

- ii. When showing the video, the following stops are suggested so that discussion can occur using the questions offered by IFAW, the producers of the video:
Source: IFAW Ages 11–14 Unit Lesson Plans “Keep Wild Animals Wild: Break the Wildlife Trade Chain,” Lesson 2, pp. 3–4, copyright 2015.
(<https://s3.amazonaws.com/ifaw-pantheon/sites/default/files/legacy/education-publications/us/us-aae15-keep-wild-animals-wild-lesson-plans-ages-11-14.pdf>)

9:59 (at the end of chapter 1):

What makes a wild animal wild?

10:35 (after the scene where the wildlife trade products are shown):

Do people really need these things? Why or why not?

10:45 (after the segment about the exotic pet trade):

What if a shop sold wild green iguanas or other “exotic” pets in your community?

What might happen if people buy iguanas or other wild animals to have as pets?

What do you think could happen if they refuse to buy them?

19:48 (just before segment on drivers of wildlife trade):

Why do you think people participate in wildlife trade?

25:28 (at the end of chapter 3):

How is wildlife trade relevant to you?

10. Post-Video Discussion:

A. Pre-K – Grade 2

After the second viewing ask participants to share what they learned from the video about wild animals and what they think others should know. Make a record of the ideas shared to refer to later. If there are still decisions to change on the wild/not wild chart they should be addressed during this time as well.

B. Grades 3 – 4 and C. Grades 5 – 6

- i. After viewing the video ask the participants to sit quietly for a minute and think about how the video made them think and feel, and if anything surprised them. Then, have them share their thoughts with a partner. When enough time for sharing has passed, ask for volunteers to share what was discussed.
- ii. Next, return to the large group questions and determine the answers to those and whether they were all addressed.
- iii. To connect the video to the beginning of this activity, have participants return to their small groups from the rhinoceros poster exercise in Steps 2 – 5 to discuss what they had recorded and evaluate their proposed plan with the new information they were given in the video. Have a representative from each group summarize their discussion to the large group.
- iv. Finally, in preparation for the culminating exercise, ask the participants to think about what they would want to tell others about wildlife trade, and how and why wild animals should be protected and allowed to remain wild.

11. Culminating Exercise: This can be used as the **Evaluation Exercise** for this activity.

As an introduction to this exercise, explain to participants that in order for the wild animal problems that they have learned about in this activity to be solved, people have to be told they exist and be given an explanation about why they happen and how they can be stopped. Some people need to be told reasons why there should be concern. Emphasize that in the activities they have been doing they have collected a lot of that information and now it is time to share it with others so that they can spread their knowledge of how to help protect wild animals and encourage respect for them.



Depending on presenter preference; participant level, ability, and topic coverage; and materials availability, participants can be asked to create a drawing, poster, or mural, either individually or in groups, that addresses some type of wildlife conservation issue related to wildlife trade and encourages responsible wildlife conservation practices. Explain that they had an example to follow of how information can be given in poster form at the beginning of this activity with the *African Rhinos* poster that they used to gather information. They can consult that for ideas of how to present their information. Give participants the opportunity to explore topics that interested them during the activity. There are many possibilities. Some suggested topics by level include:

A. Pre-K – Grade 2

Keeping Wild Animals Wild – How and Why?

Respecting and Protecting Wild Animals

Wild vs. Not Wild Animals – How are they different?

B. Grades 3 – 4

What is Wildlife Trade?

Animals Affected by Wildlife Trade

Ways Animals are Affected by Wildlife Trade

Think Before You Buy

C. Grades 5 – 6

The Wildlife Trade Chain

What is being done to stop illegal Wildlife Trade?

How are people affected by Wildlife Trade?

How are ecosystems being affected by Wildlife Trade?

What can I (You) do to stop illegal Wildlife Trade?

Numerous alternatives and additions to these topics, culminating exercises, and presentation methods can be found in the IFAW unit lesson plans listed at the beginning of the video section (prior to Step 6). Supplemental text material, in the form of age-targeted student magazines associated with each set of unit lesson plans, is available for extended research into wildlife trade topics. These can be found at the Keep Wild Animals Wild webpage of the IFAW website:

<https://www.ifaw.org/united-states/our-work/education/keep-wild-animals-wild>

ADDITIONAL INSTRUCTIONAL RESOURCES

Instructional Background and Resources:

Helping Out activities are designed to reinforce various environmental concepts in relation to the storyline of *Helping Brother Rhinoceros* using a multidisciplinary approach to engage different learning styles. The activities can be used separately or in groups, and each individual activity can be used in sections to provide the appropriate amount of concept development for the level of instruction desired. This allows the presenter the flexibility needed for differentiated instruction and scaffolding.

Although these activities address common life science and environmental science concepts, they are using subjects that may be unfamiliar to most. It is for this reason that these activities be thought of as **supplements** to support initial traditional instruction that uses familiar subject matter. As such they can be used to expand the scope of concept development to assist in meeting Next Generation Science Standards (NGSS) to the extent desired. NGSS call for demonstrations of understanding such as constructing arguments and explanations, developing models, determining patterns and making observations using examples from different and wide-ranging aspects of a given concept. These activities can assist in achieving those outcomes by providing reinforcement, structured/guided thinking skills practice, and/or depth of coverage with additional examples from a different perspective. A table showing overall NGSS alignment by Helping Out activity and grade can be found on the page immediately following this Instructional Background and Resources explanation. Specific NGSS supported by each activity are given in this ADDITIONAL INSTRUCTIONAL RESOURCES section at the beginning of the page dedicated to each specific activity.

The use of the book as a literary instructional vehicle for these activities provides further support to instruction in meeting ELA/Literacy Standards. Just as with NGSS, ELA/Literacy Standards require the use of multiple sources to achieve the desired outcomes. These materials provide those resources. A listing of the ELA/Literacy standards that could possibly be supported by these activities can be found on the Introductory Reading Comprehension Activity page of this ADDITIONAL INSTRUCTIONAL RESOURCES section.

Most concepts are generally defined and explained within the procedure of each activity. If further information is desired, websites are included within the procedures of each activity that can provide additional resources and reference material to help with background on the many aspects of the concepts covered in these activities.

Next Generation Science Standards Supported by Helping Out Activities by Grade

	HO #1: Helping Hands, Many Talents	HO #2: A Place for Everyone, Everyone in Their Place	HO #3: Caught in the Web of Life	HO #4: Who Needs Help?	HO #5: Help is on the Way
KINDERGARTEN	K-2-ETS1-2; K-LS1-1; K-ESS2-2; K-ESS3-1	K-2-ETS1-1; K-LS1-1; K-ESS2-2; K-ESS3-1			K-LS1-1; K-ESS2-2; K-ESS3-1; K-ESS3-3
GRADE 1	K-2-ETS1-2	K-2-ETS1-1; 1-LS1-1; 1-LS1-2			1-LS1-2
GRADE 2	2-LS4-1; K-2-ETS1-2	K-2-ETS1-1; 2-LS4-1			2-LS4-1; 2-LS4-1
GRADE 3	3-LS4-3; 3-LS1-1; 3-LS4-2; 3-5-ETS1-1	3-5-ETS1-1; 3-5-ETS1-2; 3-LS4-3; 3-LS4-4	3-LS4-3	3-LS4-3; 3-LS4-4; 3-LS1-1; 3-LS4-2	3-LS4-4; 3-LS1-1; 3-LS4-2
GRADE 4	4-LS1-1; 3-5-ETS1-1	3-5-ETS1-1; 3-5-ETS1-2; 4-LS1-1		4-LS1-1	4-LS1-1
GRADE 5	3-5-ETS1-1	3-5-ETS1-1; 3-5-ETS1-2	5-PS3-1; 5-LS2-1		5-ESS3-1
GRADE 6	MS-LS2-5	MS-LS2-2	MS-LS1-6; MS-LS2-3; MS-LS2-4; MS-LS2-2; MS-LS2-5	MS-LS2-4; MS-LS2-5; MS-ESS3-3	MS-LS2-4

INTRODUCTORY READING COMPREHENSION ACTIVITY

The following ELA/Literacy standards may be supported by this activity when used with the associated activities:

RI.K.1 With prompting and support, ask and answer questions about key details in a text.

W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.

RI.1.1 Ask and answer questions about key details in a text.

RI.1.2 Identify the main topic and retell key details of a text.

W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.3.7 Conduct short research projects that build knowledge about a topic.

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1)

W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

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).

WHST.6-8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

ACTIVITY 1: HELPING HANDS, MANY TALENTS

This activity can be used to support instruction to meet any one or more of the following ***Next Generation Science Standards***:

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Additional Resources:

Procedure Step 18 C: African Savanna Puzzle Picture on following page

African Savanna Ecosystem

Weave delicate nests that hang from tree branches to protect them and young from predators



Bill helps it make its nest as well as eat seeds and collect insects to feed to young

Long neck and legs to reach high into the trees for food



Spots on fur help hide or camouflage it

Very strong; can knock down trees, dig for water and defend itself from predators



Tusks that are used to dig for water and defend itself from predators

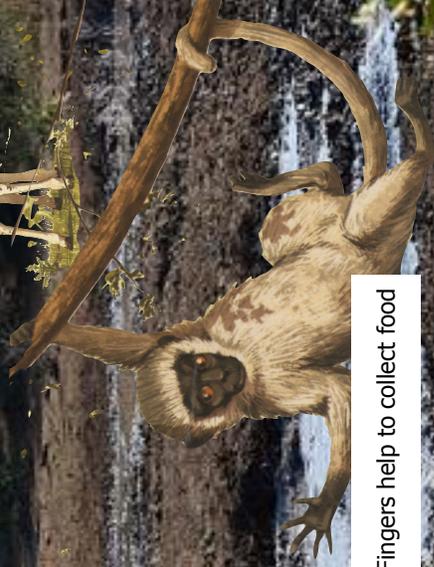


Venomous bite helps protect it from predators

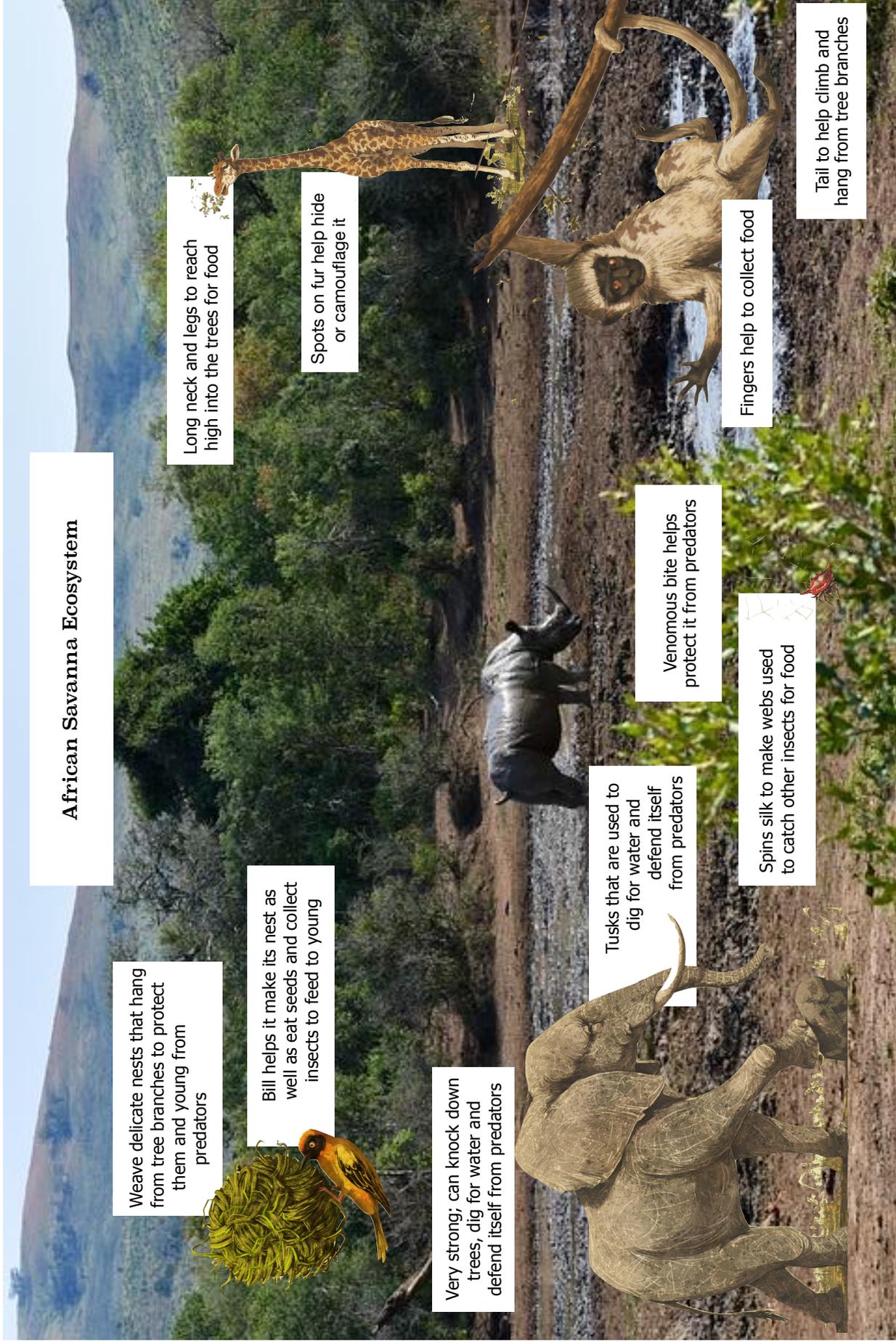


Spins silk to make webs used to catch other insects for food

Fingers help to collect food



Tail to help climb and hang from tree branches



ACTIVITY 2: A PLACE FOR EVERYONE, EVERYONE IN THEIR PLACE

This activity can be used to support instruction to meet any one or more of the following **Next Generation Science Standards**:

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

ACTIVITY 3: CAUGHT IN A WEB OF LIFE

This activity can be used to support instruction to meet any one or more of the following **Next Generation Science Standards**:

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

ACTIVITY 4: WHO NEEDS HELP?

This activity can be used to support instruction to meet any one or more of the following ***Next Generation Science Standards***:

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

ACTIVITY 5: HELP IS ON THE WAY

This activity can be used to support instruction to meet any one or more of the following **Next Generation Science Standards**:

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

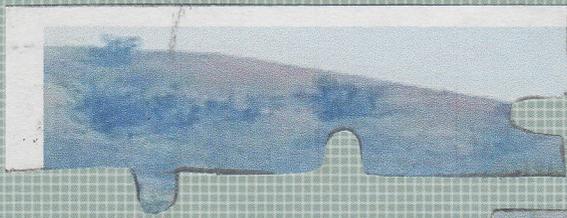
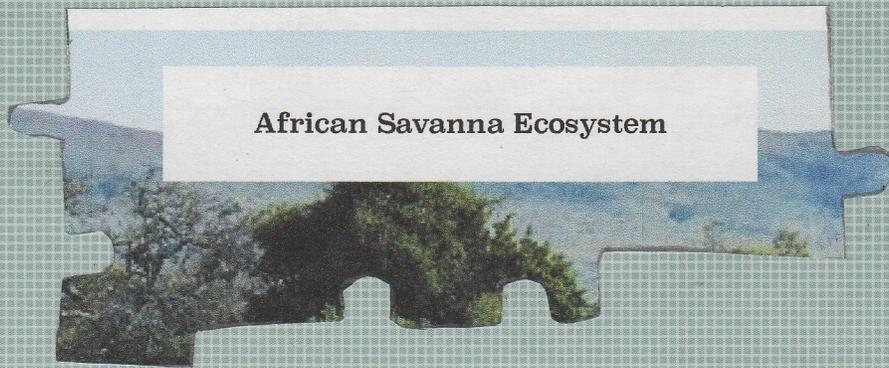
MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

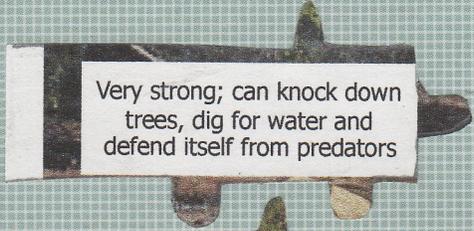


Appendix A - African Savanna Ecosystem Puzzle



Appendix A - continued

Very strong; can knock down trees, dig for water and defend itself from predators



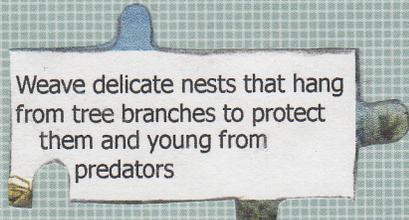
Spins silk to make webs used to catch other insects for food



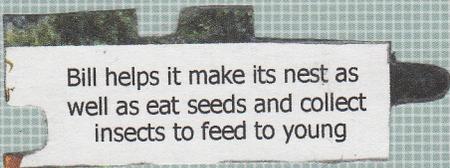
Tail to help climb and hang from tree branches



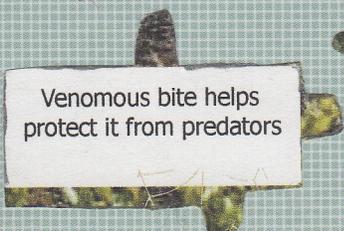
Weave delicate nests that hang from tree branches to protect them and young from predators



Bill helps it make its nest as well as eat seeds and collect insects to feed to young



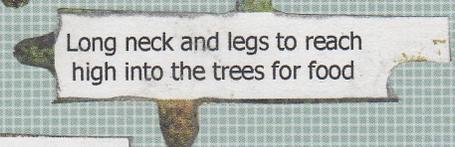
Venomous bite helps protect it from predators



Spots on fur help hide or camouflage it



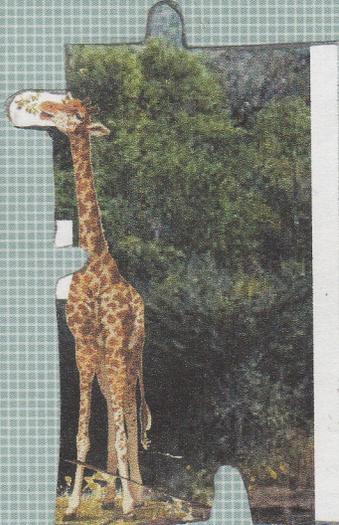
Long neck and legs to reach high into the trees for food



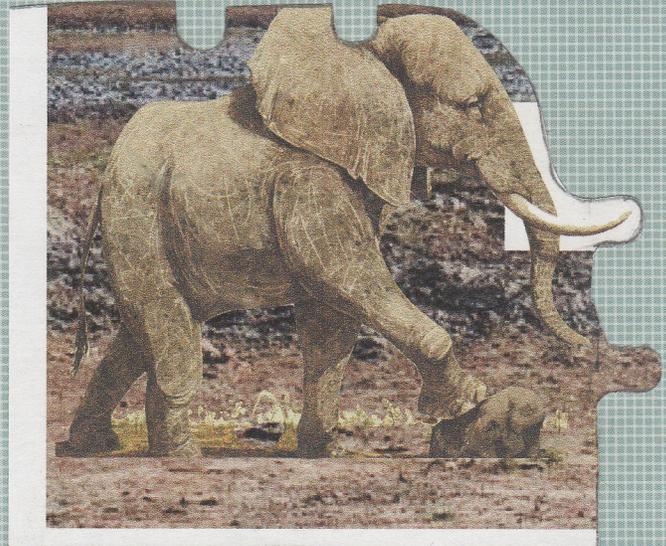
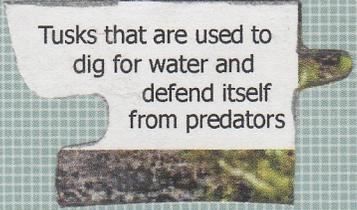
Fingers help to collect food



Tusks that are used to dig for water and defend itself from predators



Tusks that are used to dig for water and defend itself from predators



African Savanna Wildlife Guide Cards



Black Rhinoceros



Scientific Name: *Diceros bicornis*

"Black Rhinoceros (*Diceros bicornis*) at Ngorongoro Conservation Area, Tanzania" - Yoky
<https://a-z-animals.com/animals/black-rhinoceros/pictures/3990/>

Habitat: Tropical bushland, grassland, and savannas

What They Eat: Herbivore (browser); leaves, shoots, fruits, berries, and bark of shrubs

What Eats Them: Lions attack young and weak

Threats: Hunted by humans for horns

Life Cycle: Single offspring with gestation of 15 months; 2 years before offspring become independent; lives up to 35 years

Special Features: Hard, thick skin; two large horns for defense and digging up roots; lips with a hook-like point to strip leaves off branches; excellent hearing and smell

Sources: Accessed March 2018

<https://a-z-animals.com/animals/black-rhinoceros/>

<https://www.savetherhino.org/rhino-info/rhino-species/black-rhinos/>

Vervet Monkey



Scientific Name: *Chlorocebus pygerythrus*

"Vervet monkeys, Lake Manyara National Park, Tanzania" - Fanny Schertzer
<https://a-z-animals.com/animals/vervet-monkey/pictures/4462/>

Habitat: Savanna, woodland, and forests

What They Eat: Omnivore; eats both plants (flowers, fruits, leaves, bark, roots, bulbs, seeds and seed pods, grasses) and animals (insects, eggs, rodents, birds and other small animals)

What Eats Them: Eagle, leopard, serval, snakes

Threats: Habitat loss; adapts to many different environments, but can be considered a pest in urban environments where it has found suitable habitat

Life Cycle: Single offspring with 5.5 month gestation; fed by mother for 8-12 months; lifespan 12-24 years

Special Features: Fingers to collect food, long tail to balance and swing on the tree branches; runs very fast and climbs trees to escape predators

Source: Accessed March 2018
<https://a-z-animals.com/animals/vervet-monkey/>

African Bush Elephant



Scientific Name: *Loxodonta africana*

"African Bush Elephant in Mikumi National Park, Tanzania" - Oliver Wright
<https://a-z-animals.com/animals/african-bush-elephant/pictures/4012/>

Habitat: Grasslands, savanna, and woodlands

What They Eat: Herbivore (browser); leaves, fruits, and bark stripped from trees and shrubs along with long grasses and roots; will knock down trees if they cannot reach the leaves; need large amounts of water

What Eats Them: Adults have no natural predators; lions and hyenas attack young and weak

Threats: Hunted by humans for ivory tusks; loss of habitat due to human development

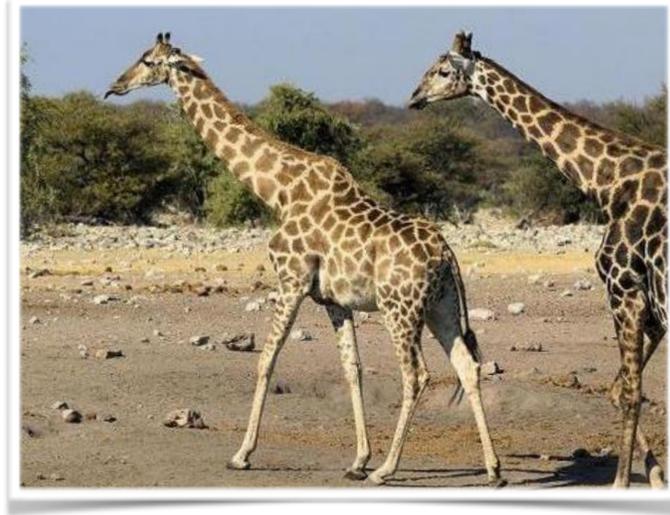
Life Cycle: Single offspring with 20-24 month gestation; young fed by mother for 6-18 months and stays with herd for 6 years (until tusks develop); lifespan 60-70 years

Special Features/Adaptations: Trunk used to drink water, dig for water and grab plant material; tusks used for defense and to dig for food (roots) and water to create water holes; very strong, able to knock down trees, dig for water and defends itself from predators; forms strong social groups, a behavior that provides protection; spreads seeds in dung that germinate throughout their range

Source: Accessed March 2018

<https://a-z-animals.com/animals/african-bush-elephant/>

Giraffe



Scientific Name: *Giraffa camelopardalis*

"Giraffes" - Hans Hillewaert

<https://a-z-animals.com/animals/giraffe/pictures/526/>

Habitat: Open woodlands and savanna

What They Eat: Herbivore (browser); mostly eat tree leaves and shoots along with flowers, fruits, buds, seeds and sometimes grass; do not need much water because they get a large amount from their food

What Eats Them: Lions mostly, but also leopards and hyenas

Threats: Hunted by people; loss of natural habitats due to human development; large number of young do not survive first year due to natural predator attacks

Life Cycle: Single offspring with 15 month gestation; young fed by mother for 13 months; lifespan 20-25 years

Special Features/Adaptations: Long neck with long legs help it reach leaves in the tall trees; uses long legs with powerful feet to kick predators; spotted markings of each individual are unique and provide camouflage; large sensitive eyes help to see great distances because of their height; long dark tongue, grasping lips and flattened, grooved teeth strip leaves of trees from its branches

Source: Accessed March 2018

<https://a-z-animals.com/animals/giraffe/>

Yellow- and Red-billed Oxpecker



Scientific Name: *Buphagus spp.*

The Mighty Oxpecker

<https://indianapublicmedia.org/amomentofscience/mighty-oxpecker/#>

Inset: Kruger National Park, South Africa, May 2006 - safariranger

https://www.birdforum.net/opus/Yellow-billed_Oxpecker

Habitat: Open savanna, grassy areas with shrubs

What They Eat: Carnivore (parasitic); feed on parasites such as ticks, flies, lice, worms on the fur and skin of many mammals (considered hosts) including the rhinoceros, as well as host's blood; also eats ear wax, thought to be for bacteria to help digestion

What Eats Them: Birds of prey, reptiles, small carnivores

Threats: Pesticide use in farmlands causing population declines; dependent on host populations

Life Cycle: Mate on host's back; lay 2-3 eggs in protected nests lined with grasses and fur from hosts; incubated by both parents 12-13 days; reach maturity in 8 months

Special Features/Adaptations: Sharp claws that allow them to grab onto the backs of large mammals; broad, thick beaks with a scissoring or pecking motion to pick out ticks on animal hosts; shriek to alarm when predators are close

Sources: Accessed March 2018

<https://indianapublicmedia.org/amomentofscience/mighty-oxpecker/#>

http://www.softschools.com/facts/animals/oxpecker_facts/634/

<https://www.sabisabi.com/wildfacts/redbilled-oxpeckers/>

Spider



Order: Araneae

https://i1.wp.com/www.ecofriendspestcontrol.com/wp-content/uploads/2014/05/Spider-Spinybacked_481138-824x683.jpg

Habitat: Grasslands and wooded areas

What They Eat: Carnivore (Insectivore); eats all kinds of insects that are trapped in its web

What Eats Them: Birds and wasps

Threats: Habitat loss

Life Cycle: Females weave egg sacs after mating and deposit several hundred eggs in it, then hide it in their web or in leaf litter; eggs develop into spiderlings and then adults

Special Features/Adaptations: Spins silk to make webs to catch other insects for food; venomous bite helps to protect it from predators; spiny claws on each leg help to grip onto web, walk on hard surfaces, or hold on to prey; eight eyes used for locating prey and catching prey, and detecting movement

Sources: Accessed March 2018

https://en.wikipedia.org/wiki/Orb-weaver_spider

https://en.wikibooks.org/wiki/Wikijunior:Bugs/Orb_Weaver

Weaverbird



Family: Ploceidae

Left: A nest in the early stages of construction

https://en.wikipedia.org/wiki/Ploceidae#/media/File:Under_Construction_-_Weaver_Bird.jpg

Center: Village Weaver, male. Southern race.

https://commons.wikimedia.org/wiki/File:Ploceus_cucullatus_male.jpg

Right: Black-headed weaver (*Ploceus cucullatus*) male nest building, Queen Elizabeth National Park, Uganda

[https://en.wikipedia.org/wiki/Ploceidae#/media/File:Black-headed_weaver_\(Ploceus_cucullatus_bohndorffi\)_male_nest_building.jpg](https://en.wikipedia.org/wiki/Ploceidae#/media/File:Black-headed_weaver_(Ploceus_cucullatus_bohndorffi)_male_nest_building.jpg)

Habitat: Savanna, grasslands, and forests

What They Eat: Omnivores; eat plants (seeds) and animals (insects and spiders); feed chicks insects for the protein to help them grow

What Eats Them: Serval, eagles, hawks

Threats: Loss of savanna habitat

Life Cycle: Female mates with male of the most desirable nest; lays eggs in nest and incubates them alone; eggs hatch in two weeks; in three weeks chicks are independent

Special Features/Adaptations: Bill shaped to help crack seeds and catch insects; build delicate and complicated nests by weaving and tying knots with grass and other plant material using bills with some help from their feet

Sources: Accessed March 2018

<http://weavers.adu.org.za/educ.htm>

<http://what-when-how.com/birds/village-weaver-birds/>

Wildebeest



Scientific Name: *Connochaetes taurinus*

"Wildebeests in the Masaai Mara" - DEMOSH
<https://a-z-animals.com/animals/wildebeest/pictures/2579/>

Habitat: Grasslands, savanna

What They Eat: Herbivore (grazer); prefer short, green grass that have been "mowed" short by buffalo or zebra, as well as green grass regrown after fire; need water every other day

What Eats Them: Lions, hyenas, cheetahs

Threats: Habitat loss, especially loss of migratory corridors; illegal poaching for bushmeat

Life Cycle: Single offspring with 8.5 months gestation; ready to stand and travel soon after birth; lifespan is 15-20 years

Special Features/Adaptations: Live in large herds for protection from predators; can sense rain and migrate following rains

Sources: Accessed March 2018

<https://a-z-animals.com/animals/wildebeest/>

http://www.softschools.com/facts/animals/wildebeest_facts/254/

African Buffalo



Scientific Name: *Syncerus caffer*

"African buffalo (*Syncerus caffer*), picture taken at Ngorongoro Conservation Area, Tanzania" - Yoky
<https://a-z-animals.com/animals/buffalo/pictures/1642/>

Habitat: Forests, woodlands, and savanna

What They Eat: Herbivore (grazer); tall, coarse, or green grasses

What Eats Them: Lions

Threats: Habitat loss; disease; illegal poaching for bushmeat

Life Cycle: Single offspring with 11.5 months gestation; lifespan 15-22 years; large herds of both males and females; nearby herds sometimes mix; herds tend to merge in wet season and break apart during the dry season

Special Features/Adaptations: Mouths are not well suited for eating very short grass; large size and unpredictable behavior with very destructive horns

Sources: Accessed March 2018

<https://a-z-animals.com/animals/buffalo/>

https://en.wikipedia.org/wiki/African_buffalo

African Lion



Scientific Name: *Panthera leo*

"Lion Cub with Mother in the Serengeti" - David Dennis

<https://a-z-animals.com/animals/lion/pictures/2226/>

Habitat: Grasslands, savanna, and woodlands

What They Eat: Carnivore; wildebeest, buffalo, zebra, occasionally young giraffe and other megaherbivores; also smaller antelopes and warthogs if other food is not available

What Eats Them: Tertiary consumer (apex predator), although packs of hyenas can attack and kill when food is scarce; elephants, buffaloes, and giraffes see them as a threat and can injure them fatally to fend them off

Threats: Humans kill out of fear or for trophies; habitat loss due to increasing human development; disease (canine distemper)

Life Cycle: One to six offspring with about 4 months gestation; cubs extremely helpless and usually only half survive a year and fewer survive to two years; lifespan 8-15 years

Special Features/Adaptations: Large paws with soft pads and retractable claws that help them climb, run and catch prey; strong jaws with teeth shaped to slice flesh; hunt in prides of related females, their offspring, and one to three males which help capture large prey

Source: Accessed March 2018

<https://a-z-animals.com/animals/lion/>

Kudu, Greater & Lesser



"Three greater kudus amongst brown grass in Ruaha in Tanzania."
Paul Shaffner
<https://a-z-animals.com/animals/kudu/pictures/2494/>
Inset: "Male Greater Kudu, Kruger National Park, South Africa"
Lok1monk33 at en.wikipedia
<https://a-z-animals.com/animals/kudu/pictures/2499/>

"Lesser Kudu (Tragelaphus imberbis)" - Steve
<https://a-z-animals.com/animals/kudu/pictures/2496>



Scientific Name: *Tragelaphus strepsiceros & imberbis*

Habitat: Woodlands, grasslands, and savanna

What They Eat: Herbivore (browser); leaves from the trees and bushes, herbs, flowers, berries and fallen fruits.

What Eats Them: Lions, hyenas, leopards, cheetahs, wild dogs

Threats: Challenged by a loss of habitat but have moved and adapted to other areas where there are better food and water sources; illegal poaching for bushmeat

Life Cycle: One offspring with about 8 month gestation period; lifespan 8-14 years

Special Features/Adaptations: Run very fast and able to easily move through woodlands to escape from predators; fur coloration provides camouflage to hide from predators

Source: Accessed March 2018
<https://a-z-animals.com/animals/kudu/>

African Fish Eagle



Scientific Name: *Haliaeetus vocifer*

Left: "A third-year juvenile in Tanzania" - Jenny Varley

https://en.wikipedia.org/wiki/African_fish_eagle#/media/File:Haliaeetus_vocifer_-near_Grumeti,_Serengeti,_Tanzania-8.jpg

Center: "African fish eagle (*Haliaeetus vocifer*), Kazinga Channel, Uganda" - Charles J Sharp

[https://en.wikipedia.org/wiki/African_fish_eagle#/media/File:African_fish_eagle_\(Haliaeetus_vocifer\).jpg](https://en.wikipedia.org/wiki/African_fish_eagle#/media/File:African_fish_eagle_(Haliaeetus_vocifer).jpg)

Right: "African fish eagle (*Haliaeetus vocifer*) feeding on a fish; Chobe National park, Botswana" - Charles J Sharp

[https://en.wikipedia.org/wiki/African_fish_eagle#/media/File:African_fish_eagle_\(Haliaeetus_vocifer\)_feeding_composite.jpg](https://en.wikipedia.org/wiki/African_fish_eagle#/media/File:African_fish_eagle_(Haliaeetus_vocifer)_feeding_composite.jpg)

Habitat: Found over most of continental Africa south of the Sahara Desert, near freshwater lakes, reservoirs, and rivers

What They Eat: Carnivore; feeds mainly on fish; also feeds on ducks, flamingos, small turtles and terrapins, baby crocodiles, lizards, frogs, and carrion (dead animals), hyraxes, monkeys, domestic fowl (chickens), waterfowl, turtles, baby alligators, and small mammals

What Eats Them: No predators; top of food chain

Threats: None

Life Cycle: Pairs mate for life; one to three eggs with 42-45 day incubation, often produce two or three chicks; those surviving first year have lifespan of 12-24 years

Special Features/Adaptations: Structures on its toes called spicules that allow it to grasp fish and other slippery prey, grabs prey from the water with its large, clawed talons; hook-shaped beak helps tear flesh

Source: Accessed March 2018

https://en.wikipedia.org/wiki/African_fish_eagle

Vulture



Various species of Family Accipitridae (Old World Vultures)

"White-backed vultures (*Gyps africanus*) feed on a carcass of a wildebeest in Masai Mara National Park, Kenya" - Magnus Kjaergaard
<https://en.wikipedia.org/wiki/Vulture>

Habitat: Savanna, grasslands near water

What They Eat: Carnivore (scavenger); carrion (dead animals), prefer rats

What Eats Them: Hawks, snakes, wild cats

Threats: Declining populations due to bushmeat trade; intentional and unintentional poisoning; habitat loss due to human development

Life Cycle: One egg with up to 2 months incubation; lifespan 20-30 years; live singly or in colonies; feed in large groups.

Special Features/Adaptations: Excellent eyesight helps them spot carcasses from great distances; stomach acid is able to kill harmful bacteria and viruses from the rotting carcasses and stop diseases from spreading into the environment

Sources: Accessed March 2018

<https://a-z-animals.com/animals/vulture/>

https://en.wikipedia.org/wiki/Rüppell%27s_vulture

<https://en.wikipedia.org/wiki/Vulture>

https://en.wikipedia.org/wiki/White-backed_vulture

Plains Zebra



Scientific Name: *Equus quagga*

"A Plains Zebra in Tanzania" - Stig Nygaard
<https://a-z-animals.com/animals/zebra/pictures/4568/>

Habitat: Grasslands

What They Eat: Herbivore (grazer); tall, coarse, or green grasses; eat grasses of lower nutritional value than other herbivores.

What Eats Them: Lions, hyenas, leopards

Threats: Loss of habitat due to human agricultural uses

Life Cycle: Single offspring with gestation 10-12 months; stand within minutes of birth to help escape predators; stay with mother for 3 years; lifespan 20-30 years

Special Features/Adaptations: Sharp front and grinding back teeth specifically adapted to eat tough grasses; stripes help to confuse predators because they create a form of camouflage for the individuals when running as a herd; stripes may also deter biting flies

Source: Accessed March 2018
<https://a-z-animals.com/animals/zebra/>

Cheetah



Scientific Name: *Acinonyx jubatus*

"Cheetah chasing its prey" - Malene Thyssen
<https://a-z-animals.com/animals/cheetah/pictures/4484/>

Habitat: Open grasslands

What They Eat: Gazelle, wildebeest, zebra

What Eats Them: Lions, hyena, eagles and vultures attack young

Threats: Loss of habitat due to human development; less able to compete with other large predators; in some instances have been taken from the wild and domesticated; hunted for trophies

Life Cycle: Average three to four, with up to eight cubs with 3 month gestation; up to 75% of cubs do not live past 3 months due to predator attacks when mother leaves to find food; lifespan 10-12 years

Special Features/Adaptations: Strong, powerful hind legs, flexible and muscular spine, and non-retractable claws help make it the fastest land mammal; long tail helps with balance and changing direction quickly; black tear marks protect eyes from bright sun

Source: Accessed March 2018

<https://a-z-animals.com/animals/cheetah/>

Estes, R. D. 1991. The Behavior Guide to African Mammals. UC Press

Hyena



Scientific Name: *Crocuta crocuta*

"Hyena (*Crocuta crocuta*)" - Stig Nygaard

<https://a-z-animals.com/animals/hyena/pictures/1804/>

Inset: "Hyena (*Crocuta crocuta*)" - Marieke Kuijpers

<https://a-z-animals.com/animals/hyena/pictures/558/>

Habitat: Open savanna plains and grassland

What They Eat: Carnivore, sometimes a scavenger; wildebeest, monkey, birds; also vegetable matter and other animal droppings

What Eats Them: Lion, leopard, crocodile

Threats: Killed because of attacks on livestock and human fear

Life Cycle: Three (average) offspring per birth with over 3 month gestation; stay in den for a year with a supervising adult while mother leaves to hunt; lifespan 20-25 years

Special Features/Adaptations: Laugh-like call to notify others of food availability; strong jaws and digestive system allow them to digest and use nutrients from skin and bones; excellent vision and hearing helps with night hunting

Sources: Accessed March 2018

<https://a-z-animals.com/animals/hyena/>

<https://www.awf.org/wildlife-conservation/hyena>

Baboon



Scientific Name: *Papio* (five species)

"*Papio anubis* (Olive or Anubis Baboon)" - Stolz, Gary M
<https://a-z-animals.com/animals/baboon/pictures/1330/>

Habitat: Savannas, woodlands

What They Eat: Omnivore; eats mostly plants, fruits, seeds, roots, flowers, as well as insects, eggs, lizards, rodents

What Eats Them: Lions, leopards, cheetahs, pythons, wild dogs, birds of prey

Threats: Habitat loss due to agriculture and logging; killed by farmers for raiding crops; hunted for bushmeat

Life Cycle: One offspring with 6 month gestation; lifespan 15-40 years

Special Features/Adaptations: Teeth are similar to humans; highly social; strong jaws; sharp canine teeth; thick fur

Sources: Accessed March 2018

<https://a-z-animals.com/animals/baboon/>

<https://www.awf.org/wildlife-conservation/baboon>

Warthog



Scientific Name: *Phacochoerus africanus*

"Warthogs in Gorongosa National Park, Mozambique" - Brian Dell
<https://a-z-animals.com/animals/warthog/pictures/2003/>

Habitat: Woodlands, savanna

What They Eat: Omnivore; eat plants, grasses, roots, berries, bark, fungi, as well as insects, occasionally small mammals, birds, reptiles, and eggs

What Eats Them: Lions, hyenas, crocodiles

Threats: Occasionally hunted for meat and ivory tusks

Life Cycle: Up to four offspring per birth after 5.5 month gestation; lifespan 12-18 years

Special Features/Adaptations: Good sense of smell helps to locate food and detect predators and compensates for poor eyesight; two sets of tusks used to defend against predators, compete with other males, and for digging in dirt for insects

Sources: Accessed March 2018

<https://a-z-animals.com/animals/warthog/>

Estes, R. D. 1991. The Behavior Guide to African Mammals. UC Press

Black-backed Jackal



Scientific Name: *Canis mesomelas*

"Black-backed Jackal in the Masaai Mara, Kenya"- Simyre
<https://a-z-animals.com/animals/jackal/pictures/611/>

Habitat: Grasslands, woodlands

What They Eat: Omnivore, sometimes as scavengers; eat young antelope, invertebrates, reptiles, birds, sometimes poisonous snakes, also plants, fruits, berries, grass, sometimes garbage

What Eats Them: Hyena, leopard, eagles

Threats: Poisoning

Life Cycle: Average five offspring per birth with about 2 month gestation; raised by older siblings while mother leaves to hunt for food; change den sites every two weeks to deflect predators; lifespan about 8 years

Special Features/Adaptations: Work in large groups (packs) to hunt for food and protect each other

Sources: Accessed March 2018

<https://a-z-animals.com/animals/jackal/>

<https://www.awf.org/wildlife-conservation/jackal>

<https://www.livescience.com/57654-jackal-facts.html>

Impala



Scientific Name: *Aepyceros melampus*

"Impala (*Aepyceros Melampus*)"- Han Olff
<https://a-z-animals.com/animals/impala/pictures/2048/>

Habitat: Wooded savanna, dense bushland

What They Eat: Herbivore (grazer/browser); prefer green grasses but will browse on leaves, shoots, pods, and fallen dry leaves

What Eats Them: Lions, hyenas, leopards, cheetahs

Threats: Loss of habitat

Life Cycle: One offspring per birth with 6-7 month gestation; lifespan 12-15 years

Special Features/Adaptations: Able to jump more than 10 meters (33 feet) long and 3 meters (10 feet) high when threatened to confuse predators and jump over things in their way instead of going around; male has long sharp horns that are used to defend from predators and fight with other males

Source: Accessed March 2018

<https://a-z-animals.com/animals/impala/>

<https://www.livescience.com/52557-impalas.html>

Serval



Scientific Name: *Leptailurus serval*

"*Leptailurus serval* in Serengeti, Tanzania" - The Rambling Man

<https://a-z-animals.com/animals/serval/pictures/1739/>

Inset: "Serval Portrait" - Profberger at en.wikipedia

<https://a-z-animals.com/animals/serval/pictures/2467/>

Habitat: Grasslands, savanna, and marshlands

What They Eat: Carnivore; rats, mice, and other rodents, small birds, frogs, fish, large insects

What Eats Them: Hyenas, leopards

Threats: Killed for fur and by farmers for fear of their livestock; habitat loss

Life Cycle: Between 1-3 offspring per birth with 10-11 week gestation; lifespan 10 years

Special Features/Adaptations: Large ears sense motions of rodents underground; use sharp claws to dig out prey from dirt; strong back legs help it to jump high and climb trees; wade into water to pounce on prey

Source: Accessed March 2018

<https://a-z-animals.com/animals/serval/>

https://en.wikipedia.org/wiki/Serval#cite_note-33

Dung Beetle



Family: Scarabaeoidea

"Two dung beetles (*Scarabaeus laticollis*) fighting over a ball of dung" - Rafael Brix
https://en.wikipedia.org/wiki/Dung_beetle#/media/File:Scarabaeus_laticollis_2.jpg

Habitat: Grasslands, forests

What They Eat: Detritivore (eats decomposing plant and animal parts as well as feces); dung (feces) mostly from herbivores or omnivores

What Eats Them: Marabou storks, bats, honey badgers, jackals, bat-eared foxes, banded mongooses, white-tailed mongooses, armadillos, armadillos, genets, ratels, and wild cats

Threats: Pesticides

Life Cycle: One egg laid in each of one or two dung (brood) balls, hatching within 2 months; lifespan 3-5 years

Special Features/Adaptations: Recycle waste materials to help nutrients return to the ecosystem; prevent diseases by getting rid of feces that attract disease-carrying organisms; spread seeds in dung that help regrow plants; very strong, can carry very heavy weight in comparison to its size

Sources: Accessed March 2018

http://www.softschools.com/facts/animals/dung_beetle_facts/114/https://kids.nationalgeographic.com/animals/dung-beetle/#dung-beetle_1_ball.jpg

https://en.wikipedia.org/wiki/Dung_beetle

<https://animals.sandiegozoo.org/animals/dung-beetle>

<https://en.wikipedia.org/wiki/Detritivore>

Young, O.P. 2015. Predation on dung beetles (Coleoptera: Scarabaeidae): A Literature Review. Transactions of the American Entomological Society.

Tick



Order: Parasitiformes

https://commons.wikimedia.org/wiki/File:Nuttalliella_namaqua_cropped.png

Habitat: Attracted to warm, humid climates

What They Eat: Carnivore (Ectoparasite); found externally and feeds on blood of mammals, birds and sometimes reptiles and amphibians

What Eats Them: Mites, nematodes, sometimes birds

Threats: Population declines of host species

Life Cycle: Lay up to 3,000 eggs in the ground and go through three stages to become an adult which can take up to a year, each time finding a new host

Special Features/Adaptations: Carry pathogens (disease-causing organisms); mouthparts are suited for piercing skin and sucking blood

Source: Accessed March 2018
<https://en.wikipedia.org/wiki/Tick>

African Sharptooth Catfish



Scientific Name: *Clarias gariepinus*

"African Catfish (*Clarias gariepinus*) landing on the ford after its jump upstream" - Mlondozi Ford
[https://en.wikipedia.org/wiki/Clarias_gariepinus#/media/File:African_Catfish_\(Clarias_gariepinus\)_landing_on_the_ford_after_its_jump_upstream...._\(16332780150\).jpg](https://en.wikipedia.org/wiki/Clarias_gariepinus#/media/File:African_Catfish_(Clarias_gariepinus)_landing_on_the_ford_after_its_jump_upstream...._(16332780150).jpg)

Habitat: Freshwater lakes, rivers, and swamps

What They Eat: Carnivore and detritivore; feed on living and dead animal matter

What Eats Them: African fish eagle and other large waterbirds

Threats: None

Life Cycle: Development of eggs and larvae is rapid, larvae capable of swimming within 48-72 hours after fertilization.

Special Features/Adaptations: Large accessory breathing organs; fins have spines; wide mouth helps to swallow relatively large prey whole; able to crawl on dry ground to escape drying pools and able to survive in shallow mud

Source: Accessed March 2018
https://en.wikipedia.org/wiki/Clarias_gariepinus

Mongoose



Family: Herpestidae

"Mongoose (*Helogale Parvula*)"

<https://a-z-animals.com/animals/mongoose/pictures/2036/>

Habitat: Open forests and grasslands; dig burrows or hide in abandoned burrow of other small animals

What They Eat: Omnivore, eat both plants and animals; mainly rats, eggs, insects

What Eats Them: Hawks, snakes, jackals

Threats: Habitat loss

Life Cycle: One litter of up to 4 pups a year; average lifespan 10-15 years

Special Features/Adaptations: Almost immune to poison of snakes; able to open hard shells of eggs, mollusks, crabs and nuts, sometimes using a rock

Sources: Accessed March 2018

<https://a-z-animals.com/animals/mongoose/>

<https://www.britannica.com/animal/mongoose>

<https://www.nationalgeographic.com/animals/mammals/group/mongoose/>

Hyrax



Family: Procaviidae (5 species)

Rock hyrax (*Procavia capensis*) with flesh fly
[https://en.wikipedia.org/wiki/Hyrax#/media/File:Rock_hyrax_\(Procavia_capensis\).jpg](https://en.wikipedia.org/wiki/Hyrax#/media/File:Rock_hyrax_(Procavia_capensis).jpg)

Habitat: Range from dry savanna to dense rainforest to cold Afro-alpine moorland; very adaptable; in East Africa, they are found at sea level and at altitudes of more than 4,000 meters (14,000 feet)

What They Eat: Mostly herbivorous; grasses, herbs, leaves, fruit, but sometimes insects, lizards, and bird eggs.

What Eats Them: Leopards, lions, hyenas, pythons, large birds, servals, jackals

Threats: Habitat loss caused by deforestation; hunting by humans

Life Cycle: One to four offspring with gestation period of 7-8 months; lifespan 5-12 years

Special Features/Adaptations: Do not need much water because they get most of it from their food; strong molars grind up tough vegetation, and two large incisor teeth grow out to be tiny tusks, just like an elephant

Sources: Accessed March 2018

<https://en.wikipedia.org/wiki/Hyrax>

<https://a-z-animals.com/animals/rock-hyrax/>

<https://www.awf.org/wildlife-conservation/hyrax>

Leopard



Scientific Name: *Panthera pardus*

"Leopard resting in a tree" - U.S. Fish and Wildlife Service - Public Domain
<https://a-z-animals.com/animals/leopard/pictures/1793/>

Habitat: Adaptable, tropical rainforests, tree-lined savanna, deserts, mountain highlands

What They Eat: Carnivore; varied diet including impala, gazelle, warthogs, hyraxes; occasionally birds, reptiles, rodents, dung beetles when food is scarce

What Eats Them: Adults only occasionally attacked by lions; hyenas, jackals, lions, snakes, birds of prey attack young when mother leaves to hunt for food

Threats: Habitat loss due to deforestation for lumber and agriculture; hunting for trophies, meat and fur

Life Cycle: Two to six offspring with 3-3.5 month gestation; lifespan 10-15 years

Special Features/Adaptations: Short legs and long tail help with balance when in trees; spots (rosettes) help to camouflage it in its environment; very strong and muscular with retractable claws help it to climb trees; whiskers, excellent hearing and sight allows them to hunt at night

Source: Accessed March 2018
<https://a-z-animals.com/animals/leopard/>

How YOU Can Help Brother Rhino!

What can you do to help rhinoceroses?

1. **Blow your horn!** Tell everyone you know that rhinoceroses are endangered and need help.
2. **Give money or time** to an organization that works to save rhinoceroses.
3. **Grow trees!** Black rhinoceroses like Brother Rhino and lots of other animals need native trees, and deforestation hurts these animals. Planting native trees wherever you live helps animals and the environment.
4. **Refuse** to buy anything made with rhinoceros body parts, including ground-up horn.

